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PURĀTATTVA

Bulletin of the Indian Archaeological Society

Nos.1 – 4

1967–68
To
1970-71

930.15405
PUR

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DEDICATED TO

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AN EMINENT ARCHAEOLOGIST

&

A DISTINGUISHED SCHOLAR

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Editor's Note

After independence, Archaeology in India got the long awaited momentum and this resulted in the enormous expansion of archaeological activities. Whether they were within the process of natural growth or they brought about a chaos in Indian Archaeology, it cannot be denied that the new enthusiasm led to some of the remarkable discoveries and rewarding fieldwork. It gave new dimensions to Archaeology and greatly expanded its scope.

In view of the accumulated mass of data and the immense scope of work lying ahead, the necessity of such a coordinating body, which can also give a sense of organisation and proper direction needs hardly to be emphasised. It should further serve as a suitable forum for academic discussions and thus provide opportunities to the archaeologists of the various parts of this vast country to exchange views on the diverse problems. With these primary objectives in mind, the Indian Archaeological Society has been formed, somewhat on the lines of similar institutions in other countries.

That an association like the Indian Archaeological Society should have a bulletin of its own, which can inform the world periodically about the recent trends and discoveries and the work done in India is an obvious imperative; hence this bulletin, *Purātattva*, to be published bi-annually. It will primarily include first hand reports of archaeological field work, including exploration and excavation, and their interpretation, but, at the same time, it will be fairly comprehensive in its scope. Articles dealing with scientific analyses of the past relics are particularly welcome.

In the recent years natural sciences have contributed a great deal to the study of the chronology, technology and environment of the past, especially in the countries abroad. We feel that there is a significant scope for such studies in this country. The Society and its organ '*Purātattva*' will strive in this direction and try to bring about a worthwhile collaboration between the archaeologists in the field and natural scientists working in the laboratory.

The late Prof. B. Subbarao, the noted archaeologist of India, was among those who gave birth to the idea of the formation of the Indian Archaeological Society. It is most unfortunate that he is not alive to see it materialised. We dedicate this very first number of *Purātattva* to his cherished memory.

Obviously the present number has been printed in a very short time. Hence some omissions are quite likely. For these we crave the indulgence of the readers.

Archaeology and the Rāmāyaṇa Or Dating the Rāmāyaṇa*

by H. D. SANKALIA

The *Rāmāyaṇa* has been our most popular epic. How old is it in its present form ? And how old is the story of Rāma ?

Tradition and legend invariably assert that the *Rāmāyaṇa* is at least 5000 years old, and that Rāma lived much before Krishṇa, the hero of the *Mahābhārata*.

No doubt, scholars, Indian and Western, orthodox and critically-oriented, have tried to date the *Rāmāyaṇa* as it has come down to us, as well as the kernel of the story, viz., the Ikshvāku dynasty and the King Janaka of Mithilā, families in which Rāma and Sītā were respectively born, and the kidnapping of Sītā by Rāvaṇa.

Leaving out the very high dates, some Indian scholars seriously believe that Rāma lived between 2850 B.C. and 1950 B.C. Pargitar, a famous English scholar after his critical collation of all the Purāṇas placed Rāma in 1400 B.C. Other German and English scholars thought that the kernel of the story might go to 800 B.C., that is a few centuries before the Buddha.

It was, however, agreed almost unanimously that the *Rāmāyaṇa* in its present form was quite late, composed between 400 B.C.-200 A.D., though scholars like Radhakrishnan thought that its philosophical views might belong to the 6th century B.C. Nevertheless, there are scholars who would accept the society described in the *Rāmāyaṇa* as belonging to the Vālmiki age—a view which appears to be very uncritical.

On both these points viz., the kernel of the story—and the stages of the composition of the *Rāmāyaṇa*, archaeology can now throw much more positive light. For, in the last 20 years, several excavations have been carried out in different parts of India which give factual evidence regarding the layout of the cities, nature of houses, palaces, religious buildings, dress and ornaments, cloth, food and drink, and methods of disposal of the dead, against which the *Rāmāyaṇa* data can be checked.

The *Rāmāyaṇa* refers to very few cities. In the Bālakāṇda Viśvāmitra tells Rāma about the origin of the cities of Kauśāmbi, Vaiśāli, Mithilā, Girivraja, Ayodhyā and others. All these are situated in the present U. P. and Bihar. Excavations since 1947 have enabled us to say that all these cities were founded before 6th century B.C. and, according to a few C-14 dates their earliest existence might be placed around 1000 B.C. This has an immense bearing upon the antiquity of the Rāma story. For the first time we can confidently say that the kernel of the story, if true, could not have been earlier than 1000 B. C., because prior to that there was no organized city life in the Gangetic Valley.

But the same cannot be said about the foundation of Takshaśilā (Taxila) and Pushkalāvatī (Chārsada), near modern Rawalpindi and Peshawar respectively. According to the Uttarakāṇḍa these cities were founded by the sons of Bharata, viz. Takshaka and Pushkala respectively,

*This is a preliminary summary of a series of lectures to be delivered at the Maharaja Sayajirao University of Baroda. The published lectures will be documented.

after defeating the Gāndharvas. Excavations by Sir John Marshall at Taxila, and Mortimer Wheeler at Chārsada have shown that these cities were founded about the 6th century B.C. and hence Wheeler said :

" Briefly, then, if these later impacts be omitted, the story of Pushkalāvatī is essentially the story of Taxila. In affirming that the two cities were founded at the same time, the *Rāmayāṇa* has more semblance of historical authority than is commonly accredited in detail to the Indian epics ".

But a little consideration of the description of the two cities in the *Rāmāyaṇa* definitely indicates that the epic had in view *not* the simultaneous foundation of the *earliest* cities at these places, but the simultaneous foundation of the Indo-Greek cities at Sirkap near Taxila and Shaikhan near Chārsada respectively. These are laid out in a chess-board pattern with arterial roads, and answer closely the description of Takshaśilā and Pushkalāvatī of the *Rāmāyaṇa*, whereas the earlier city at Bhir Mound, Taxila is characterized by narrow irregular lanes and houses. The Indo-Greek city at Shaikhan was excavated by Dani in 1965. C-14 dates accurately place its foundation to 132 B.C. Archaeology thus confirms the traditional and scholarly view that the Uttarakāṇḍa of the *Rāmāyaṇa* was added later. However, the description of cities like Ayodhyā, and Laṅkā with seven and eight storey buildings, are certainly imaginary, because even at Mohenjo-daro, the tallest building could not have been more than two storeys in height. One could however concede these cities had ramparts and moats (though how Laṅkā which was on a hill could have both these is inconceivable !!). For excavations have exposed remains of ramparts at Rajgir (Rājagṛih, Bihar), at Śiśupālagarh (Orissa), and moats at Taxila, Chārsada and Ujjain.

Thus some of the cities in the *Rāmāyaṇa* can claim hoary antiquity, but not the life led by the people. This would appear to reflect the great prosperity that India experienced because of favourable foreign trade, particularly with Rome and other Western countries. As a result Roman gold, wine and women literally invaded India. The *Rāmāyaṇa* not only speaks of golden ornaments and vessels, but doors and walls covered with gold sheets. Wine flowed freely and abundantly. One would normally associate it with the Rākshasas who were known for their un-Aryan life. But it is not so. It was common in every walk of life, and enjoyed at Ayodhyā, Kishkiṅdhā (the Vānara capital) as well as at Laṅkā. And also in the āshrama of Bharadvāja which was located in a forest !! Here two kinds of wine—Maireya and Saura—were offered to the army of Bharata. This may appear strange and extremely incongruous, but the Roman amphora often with a black resinous residue still sticking to its inner wall has been found not only on the coastal towns—Dwarka, Kolhapur, Pondicherry—but at such inland towns as Junnar and Nevasa, and had also reached the Buddhist monastery at Devnimori, District Sabarkanthe in North Gujarat and Nagarjunakonda in Andhra. The effect of this widespread use of Roman wine is reflected in the posture of amorous couples in the caves of Western India, in the sculptures on the stupa at Amaravati, Nagarjunakonda and Mathura. It is this Bacchanalian life which the interpolators must have witnessed and which they have depicted while describing the harem of Rāvaṇa, for instance in the Sundarakāṇḍa.

Roman wine had become a fashion, just as it has today, in high society, in which both men and women—including Rāma and Sītā—occasionally drank. Archaeology would date this precisely to a period between 1st century, B.C. and 4th-5th century A.D. The name for this Western wine, I think, should be *Vāruṇī*, a term for wine, I am told which appears only in the epics. For Varuṇa is the lord of the sea and the guardian deity of the West.

Another important criterion for dating the *Rāmāyaṇa* is iron. It occurs under the name, *Ayasa*, *Kālāyasa* or *Kārshṇāyasa*, *Loha* and is

translated as wrought iron, and steel. While the last three certainly refer to iron, even the first—*ayasa*—here stands for iron. For in the Ayodhyakāṇḍa [1] it is said that the mother of Rāma must surely have had a heart of iron (*āsyasa hṛidayam nūnam*), for it does not break on seeing him go to a forest. Copper is soft, and hence no one would compare a stony heart with it. Not only defensive and offensive weapons such as armours, swords, and arrowhead were made of iron, but even bolts for doors, and chests are said to be made of this metal. The most noteworthy is no doubt the chest, several feet long with 8 wheels, in which King Janaka had kept the famous bow. Rāma alone could wield this and thus win Sītā.

For assuming the existence of such an 8-wheeled iron or steel chest, one has to postulate the existence of advanced iron technology. This technology India had acquired only after the 5th century B. C. reaching its zenith with the manufacturing of the Iron Pillar at Delhi, which after 1500 years has not yet rusted.

The late dating of iron has been amply confirmed by numerous excavations during the last 20 years. Only at one site, Atranjikhera, District Etāh, U. P. has iron occurred in a context which C-14 method would date it to 1000 B.C. But everywhere else it has been proved to be not so early, not before 7th century B.C. And we must remember, nowhere in the world iron was used before 1500 B.C. Thus on this one ground alone the very high dating of the *Rāmāyaṇa*, and even the kernel of the story cannot be accepted. It cannot be before 1000 B.C., though the probability is that it was considerably late when iron technology was well known, and iron had replaced copper in every day use.

Among smaller items, the most curious is the mention of Lakṣmī seated on a lotus and bathed by two elephants, one on either side. This—Gajalakṣmī—Hanumān saw depicted on the Puṣpaka Vimāna ("aeroplane" of Rāvaṇa) at Laṅkā [2]. Just as Air India decorates its Boeings with typical Indian scenes, the artist might have done then. But when ? About the 2nd century B.C. For this is a familiar motif depicted in sculpture on the stupas at Bharhut and Sanchi. On these Buddhist monuments, this scene represents the nativity of the Buddha. Later it was adopted by the Hindus, with whom the goddess became Lakṣmī. This conversion itself as well as the name Lakṣmī suggests a date later than at Sanchi or Bharhut.

Such instances can be multiplied. Suffice it to say that archaeologically we might place the Ikshvāku dynasty and its hero Rāma to about 1000 B.C., but the *Rāmāyaṇa* in its present form—as the abundant use of gold, pearls, silk, wine, iron and camels, and the occurrence of Lakṣmī with elephants on the Puṣpaka Vimāna testifies—should be between the 3rd century B.C. and 4th century A.D. And certain portions which mention palaces or temples with 1000 pillars and temples with high *śikharas* still later, not before 700 A.D. Also late are references to Mars, Saturn and days etc. named after them. For until the 2nd century A.D., the Indian Calendar mentioned only the season, the *nakshtra* (constellation), the two halves (*paksha*) of the month and the *tithī*, but not the day. The last entered our life only after the Roman contact. These appear for the first time in the Gupta Period (c. 300 A. D.).

Now that the critical editions of the *Rāmāyaṇa* and the *Mahābhārata* are compiled, it is time we plan or undertake the preparations of these national epics based on higher criticism. When these are ready then only we shall know what were the *Ur* or original *Rāmāyaṇa* and the original *Mahābhārata*.

NOTES

[1] Cr. ed., 2.35.20. [2] Cr. ed., 5.6.14.

Inter-relations between Archaeology and Plant Sciences

by VISHNU-MITTRE

Introduction

In the synthesis of knowledge, co-operation of diverse disciplines of science and humanities is very imperative chiefly with the object of enlarging the spheres of knowledge and providing solutions to the jumble of problems beyond the limits of an individual discipline. At the high level of the fuller exposition of knowledge, the various diverse disciplines are so inter-digitantly related to each other that without this realisation and without utilising the humble aid the diverse disciplines are worth, no progress in knowledge can be made. Archaeology, for instance, is directly related to history and evolution of man and obviously to anthropology and sociology. For dating of cultural horizons, physics comes to its aid and for the interpretation of former environment geology, pedology and climatology and even chemistry contribute their humble bit. Likewise there are numerous areas of common interest between archaeology and plant sciences (botany, agriculture and forestry),which can be profitably explored to provide solution and elucidation of knotty problems arising out of intensive studies in each of these disciplines.

The relation of man with plants dates from the antiquity of man although during a long span of his history he did not exercise direct and much influence on the destiny of the plant world. This indirect relation refers to the period of food gathering which covers the entire Palaeolithic and the Mesolithic. During this period he influenced vegetation through digging of roots apparently to provide food, and the discovery of fire. How far these humble influences of early man on Vegetation were able to create imbalance in the equilibrium of vegetation with the environment and thereby affected the course of its natural development may be of particular interest to students of plant sociology. Howsoever small his influence was, the early man's contact with the plant world can hardly be denied.

The direct influence of man on vegetation commenced late in the history of man and it dates from the New Stone Age—the Neolithic period. It comprised the domestication of plants and animals—the commencement of agriculture. Some scholars rightly attach great importance to this direct influence of man on vegetation and consequently distinguish the Old Stone Age from the New one on this basis. It is, therefore, of considerable mutual interest to know more and more of the plant economy of the New Stone Age through the botanical investigation of the plant remains unearthed from archaeological excavations. To an agriculturist the earlier methods of domestication and the kind of wild animals and plants domesticated are of considerable interest, for they not only provide factual information of the wild progenitors of our cultivated plants and domesticated animals but also serve as a touch-stone to prove the validity of the results of their present-day cytogenetical probing into the problem.

How far plant economy should be given the credit, it deserves, in the evolution of metallic cultures (Copper—Bronze and Iron Ages) cannot be said with certainty. But the diffusion of farming traits and cultivated plants in the post-Neolithic cultural evolution has been of consi-

derable interest from both historical and botanical view points. The cultural diffusion must have been slow and at times rapid accompanied by peaceful and violent events resulting in the rise and fall of cultures, their amalgamation and progressive change into subsequent cultures thus eventually building up the personality of India. The role of plant economy has, therefore, not been small in the evolution of cultures.

Vegetation as we understand today is the expression of prevailing environment and in it are integrated the effects of geology,soil, climate and the biota. The reconstruction of former vegetation provides information of past environment which can, however, be built up from other sources also, but the response of plant communities even to slight or minor fluctuations in environment is a decided advantage over the other methods. The importance of environment in the evolution of human cultures can be assessed from the fact that most knotty problems in archaeology are often left to the environment to explain. Botany in this respect comes to the aid of archaeology in unfolding the past environment which was the chief driving force governing the evolution of human cultures.

Together with the animal remains, the plant remains have helped in building up the chronology. The radio-carbon assay is largely dependent upon organic remains. Combining the changes in past environment with the radiocarbon assay a dating time-scale can be built up for the past events in the history of man.

The importance of such a dating mechanism in archaeology is well realised and its importance is equally well understood in dating the shifts in plant populations, the advent and extinction of certain plant genera and the introduction and progressive development of agriculture and such other events as the shifts in climates, the uplifts of mountains, changes in river courses, the origin, extension and drying up of lakes and several other features of physiographical importance.

It becomes apparent from the above that there are some areas of considerable common interest between archaeology and plant sciences. A good deal has been done abroad in exploring these common areas thus widening the horizons and opening new vistas of knowledge for both archaeology and plant sciences. The application of the above information to India is not free from difficulties and pitfalls on account of vast differences in climate, vegetation and the local problems obtaining here but the guide-lines laid by researchers abroad can be successfully followed though with small and suitable modifications. Below are discussed some common areas of mutual interest between Indian archaeology and plant sciences, which need exploration through the co-operation of respective specialists. The discussion also includes a resumè of research work hitherto carried out in this regard.

The Dating mechanism

There are several ways in which botany helps directly or indirectly in dating archaeological periods. Dendrochronology or Tree-ring analysis is one of them. It is an interesting coincidence that this method of dating prehistoric sites is the work of prehistoric people and is known as early as 1811 when De Witt Clinton estimated by this method the age of trees growing upon earth works in New York [1] but it was suggested as a method by Charles Babbage in 1837 [2]. He is the earliest natural philosopher who visualised the ultimate connection of this method with the chronology of man.

The method has been successfully applied abroad in correlating with one another the growth rings of different trees—the inner rings of young trees with the outer rings of older trees and thus from the timber used by historic and prehistoric man in the construction of his houses, it has been possible to build up chronology. Conifer woods have been found to be better over the hard woods because of regular ring formation in them. In the temperate regions, however, the method of tree-ring analysis has been found to work well and has provided a calendar com-

prising continuous and discontinuous series going back to more than 3000 years, although a reliable calendar in relation to archaeology has been built up upto about 2000 years.

Similar kind of work has not been extended to tropics where the rings are not so regularly formed and the effects of temperature and humidity cause several irregularities and at the same time timber may not have been used by the Prehistoric man for construction purposes. Greater possibilities of dendrochronological research exist in the temperate regions of India such as the Himalayas where timber derived from pine, deodar [3], spruce and fir is even today used for construction. The wood of oaks (*Quercus*) in the Himalaya has been more used as fuel rather than for construction, the possibility of finding beams of oaks in the Himalayas seem to be remote. Chowdhury [4], Chowdhury and Ghosh [5] and Chowdhury and Rao [6] have examined the possibilities of age determination of Indian woods through growth rings. In the tropical India the *Kalpavṛiksha* tree (*Adansonia digitata* L.) believed to be of African origin, is one of the long lived trees known. This may prove suitable for dendrochronology.

Apart from the chronological importance of tree ring analysis, the recognition of prehistoric timber provides information of the selective use of timber and the decline of such genera at the hands of prehistoric man. This information can go a long way in substantiating the trends in forest development inferred from pollen records. The increase in our knowledge of useful timber yielding plants may be economically exploited through their increased plantations.

The importance of plant material for C-14 determination needs no exaggeration. It has provided in Europe and elsewhere with an absolute chronology extended down from the Late Palaeolithic and has made it possible to date the events in human history much more precisely within the age range upto 70,000 years ago [7]. Some difficulties in the application of C-14 dates to archaeological periods have been pointed out by Tauber [8]. Samples of organic matter picked up from the same cultural horizon may sometimes give unidentical dates as for example samples of prehistoric cotton cloth from Paracas, Peru, showed a difference of 400-700 years [9]. Such instances are not uncommon. The difficulties and discrepancies of the kind mentioned by Tauber [10] can be overcome through improvements in methods and careful assessment before acceptance of C-14 date so that its application does not mislead.

Considerable overlap exists in Indian Neolithic and Chalcolithic as shown by radio-carbon assay and perhaps in the acceptance of C-14 dates we have not exercised the caution that ought to have been exercised. It is, therefore, very important to give due allowance to the nature and provenance of the organic matter (humus, peat, wood, charcoal) from the archaeological sites before accepting the date finally. Improved techniques have, however, tended to eliminate the wide differences in the radio-carbon assay of the same material by different labs. It is hoped that it will be possible to build up absolute chronology through radio-carbon dating of the Indian late Quaternary.

The precise dating of the commencement and decline of a particular cultural horizon is possible only where the plant matter in sections is examined inch by inch. It has become possible through pollen analysis which builds up climatically-controlled shifts in plant populations and which are designated as Pollen Zones. A standard pollen diagram built up from lake deposits and peat bogs and swamps gives a chronological sequence of pollen zones. Whearas the pollen of Cerealia points to a particular part of the diagram belonging to the commencement of the Neolithic (the post-Neolithic introduction of agriculture as at Nilgiris should, however, be determined from other sources), the correlation of pollen zones with archaeological periods is, however, determined through pollen spectra obtained from the soil sticking

CORRELATION OF POSTGLACIAL POLLEN SEQUENCE FROM HAIGAM LAKE IN KASHMIR VALLEY WITH ARCHAEOLOGY HISTORY AND CULTURE

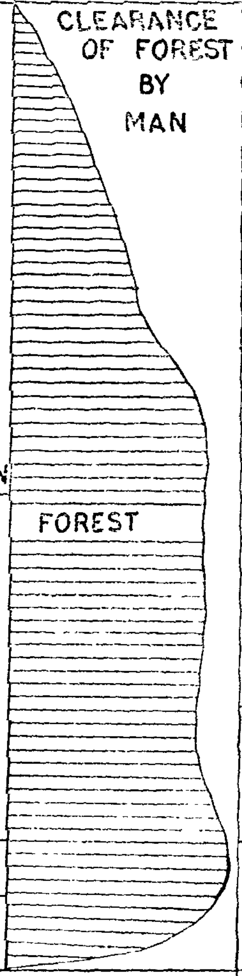
DATING		POLLEN EVIDENCE					FLOODING EPISODES		ARCHAEOLOGY HISTORY & CULTURE	
AGE IN YEARS	POLLEN STAGES	VEGETATION	CLIMATE	FOREST COVER	AGRICULTURE	OTHERS	STRATIGRAPHY	LITERATURE		
1800 RAPID DEPOSITION	fgh	Oak-alder-elm & birch absent DECLINE pine-fir forest BLUE PINE FOREST Pine mixed woods	DECREASING WARMTH Cool & dry	CLEARANCE OF FOREST BY MAN 	DECLINE IN AGRICULTURE	RECENT DECLINE IN PINE MAIZE CULTIVATION	FLOOD	970 1338 AD FAMINE WARS & INVASIONS		BRITISH SIKHS MOGHALS
1500	e	Oak-birch alder DECLINE	RAPID DETERIORATION		MAXIMUM PROSPERITY	POPLAR INTRODUCED 1400 AD DECLINE IN OAK-ALDER-ELM			MARCOPOLO 13th cent AD	GHAZICHAK ZAINULABIDDIN SHAMSUDDIN (SULTANS)
1000							FLOOD		ALBERUNI 11th cent AD	HARSHA
500	d	BROAD-LEAVED FOREST	MAXIMUM WARMTH	FOREST	MODERATE PROSPERITY			580 AD		LALITADITYA (HINDU PERIOD)
BC							FLOOD		CHINESE TRAVELLORS 404 AD-759 AD	MIHIAKULA KANISHK
500		Oak-elm-alder woods	WARM & MOIST ?						MEGALITHIC CHALCOLITHIC PROTONEOLITHIC	ASHOKA PRE ASHOKAN
1000	c	Oak-mixed conifer woods			LOW AGRICULTURE				NEOLITHIC Ph. II Mud walls and timbers 1860 BC	
1500									NEOLITHIC Ph. I	
2000	b	Pine-fir-spruce mixed woods BLUE PINE FOREST	RAPID AMELIORATION cool & moist ?		ORIGIN OF AGRICULTURE					NAGAS
2500	a	Ash-elm-alder oak woods SCRUB JUNGLE	Warm & dry INCREASING WARMTH						DWELLING PITS	

Table 1

to implements or through pollen analysis of sediments in an archaeological excavation. If the sediments in archaeological provenanace fail to yield pollen as usually it happens in India [11], other indirect methods may be used in correlation of events from pollen diagrams from lakes and swamps with the cultural horizons. Table 1 shows a similar attempt towards the correlation of post-glacial events in the Kashmir Valley. The sediments are dated through the rate of deposition in relation to indirect adoption of a C-14 date from Burzahom the Neolithic site and information of plant economy from the pollen and written records. Other events have been carefully tied up with stratigraphy and shifts in pollen curves. The results are tentative but provide a skeletal picture of post-glacial chronology in the Kashmir Valley. Future work will, however, show how far the emergence of this tentative chronology is sound and dependable.

The dating of cultural periods and their correlation with shifts in plant populations are important to a botanist in the determination of the origin and progressive increase of biotic especially anthropogenous influence on vegeta-

TABLE 2

Occasional Cold Waves and reduction of Minimum Temperature*

	Date	Station	Average Minimum in Jan. upto 1950	Lowest minimum	Difference
1.	*Cold Wave in* 1905				
	31.1.1905	Jodhpur	9.2	—2.2	11.4
	1.2.1905	Jaipur	8.3	—2.2	11.5
	2.2.1905	Patna	10.7	2.2	8.5
	2.2.1905	Allahabad	8.6	1.1	7.5
	2.2.1905	Banaras	9.1	1.7	7.4
	2.2.1905	Jabalpur	9.0	0.0	9.0
	11.2.1905	Darjeeling	1.9	—5.0	6.9
2.	*Cold Wave in* 1935				
	15.1.1935	Bombay	19.3	11.7	7.6
	16.1.1935	Delhi	7.3	—0.6	7.9
	16.1.1935	Agra	7.0	—2.2	9.2
	16.1.1935	Rajkot	10.6	—0.6	11.2
	16.1.1935	Pachmarhi	8.7	—1.1	9.8
	17.1.1935	Poona	11.7	1.7	10.0
	18.1.1935	Bhopal	9.9	0.6	9.3
3.	*Cold Wave in* 1950				
	7.1.1959	Kodaikanal	8.1	2.8	5.3
	18.1.1950	Trivandrum	22.2	18.9	3.3
	10.2.1950	Mussoorie	2.6	—6.7	9.3
	11.2.1950	Ranchi	10.6	2.8	7.8
	12.2.1950	Gaya	9.6	3.9	5.7
	13.2.1950	Shillong	3.8	—2.8	6.6

*Date extracted from S. Basu, 'Weather and Climate' *The Gazeteer of India*, I, 1965, 67-116.

tion and for the study of the after-effects of disturbance in the equilibrium between the plant community and environment resulting in the decline and or extinction of some genera as oaks and alders in the Kashmir Valley [12] or *Celtis* in Kumaon [13] and their replacement by ecotypes or immigrants from near and distant regions. The progressive decline of the Shola forest in Nilgiris is also largely due to the cumulative effects of prehistoric people. How it was achieved and who did it and when and for what purpose are some of the interesting questions which can be answered through the coordination of archaeology and plant sciences.

Environmental Archaeology

Most discussions concerning the origin and evolution of a culture, may it be the Sohanian or the Madrasian culture, or the Mesolithic, the Neolithic or the Chalcolithic or the origin and decline of the Indus Valley Civilization, all eventually end up in the environment, about which, as regards India is concerned, is much less known.

Environment is a complex thing and broadly speaking it includes climate (temperature, precipitation and humidity), physiography, interaction of communities, etc. The last two factors may be strongly influenced by climate, although physiography may also be due to other causes such as earth movements. The nature and fluctuations in climate and their influence on physiography and culture can be built up from the nature of sediments as, for instance, the sequence of glacials and interglacials or pluvials and non-pluvials, loess and other special kinds of soils. The climatic fluctuations in the periglacial areas may be manifested in the river terraces, which may all be of glacial origin or some of them of interglacial origin. Attempts have been made to tie up the Quaternary climatic fluctuations in the north-west India with those in the central and southern India through nature of sediments (alternation of gravels and silts) and animal fossils [14]. The relation of Pluvial with Glaciation is still not determined and the determination of this may have far reaching significance on the above correlations.

The study of modern patterns of temperature and precipitation can provide useful clues to the reconstruction of past climates and the true nature of the pluvial and glacial periods. A large part of the country is swept by the Monsoons in summer season, abnormal fluctuation of which cause even torrential rains and floods in regions such as the NW arid zone. Floods are, therefore, correlatable in large part of India with the monsoons—a wet period—the pluvial. Temperatures are slightly lower during this wet period. Considerable increase in precipitation in summer (June, July) is able to reduce the maximum temperature by 3-4°, whereas a slight increase in winter is able to depress the maximum temperature by 3-5°. Considerable decrease in winter precipitation in Madras, Bangalore, Trivandrum and in eastern Himalaya depresses temperature by 2°. In regions of oceanic climate the decrease in temperature is normal. The recognition of a wet phase in tropical India from sediments and referred to the Pluvial period must have originated from a perpetual monsoon period.

Winter is mostly dry in the country and the lowering of temperature is largely due to the influx of Mediterranean climate although cold waves in India have also originated from south to north as in the years 1935 and 1950 (Table 2). It is also accompanied by precipitation which is the major source of snow formation in the mountains. During the occasional cold waves a drop of 3.3—11.5° in the minimum temperature is noted throughout the country [15]. Temperature below freezing point is noted in the plains of north India down to Rajkot and Pachmarhi. Thus the effect of refrigeration is felt throughout India comparatively less in the South. A perpetual continuation of the Mediterranean climate is equivalent to glacial climate. This reveals that a glacial climate was moist in the extreme west and dry in the rest of India

whereas the pluvial climate was warm and wet. This analysis of modern climate suggests that the pluvial in India is correlatable with the Interglacial period more especially the climatic optimum and the Glacial with cool and moist (dry) climate.

The former alterations between the pluvial and non-pluvial climates during the Quaternary are reflected in the present day distribution of plants in India. During the pluvials (interglacial periods) the tropical element moved towards the north penetrating into the base of Himalayas. *Bauhinia*, *Acacia*, *Erthrina*, *Butea*, *Dalbergia*, *Milletia*, most leguminosae, *Bombax*, *Vatica*, *Nauclea*, Combretaceae, Verbenaceae, *Lagerstroemia*, *Grisleas*, *Jasminum* and *Bignonia* are the tropical members indifferent to cold which occur in NW Himalayas. The subtropical vegetational belt between the tropical and temperate belts is the cumulative result of these shifts. Members like *Osbeckia*, *Agrostemma*, *Plectranthus*, and members of Cyrtandraceae, Scitamineae, Araceae, Commelinaceae and orchids, were driven to the loftier mountains and some tropical genera as *Menispermum* and *Anandria* were driven to Siberia, where they still occur today. During the glacial or interpluvial periods several temperate plants including the arrivals from extra-Indian temperate regions such as Europe moved down into the south. Noteworthy among them are *Ranunculus*, *Xanthium*, *Veronica*, *Anagalis*, *Polygonum*, *Juncus bufonius*, *Alisma plantago*, *Myriophyllum*, *Potamogeton*, *Vallisneria*, *Zannichelia*, *Stellaria plogionosa*, *Circead alpina*, *Sanicula europea*, *Brunella vulgaris*, *Geranium*, *Potentilla* etc. The typical Himalayan species of *Berberis*, *Hypericum*, *Rubus*, *Pedicularis*, *Artemisia* and *Rhododendron* in the south Indian hills may also be attributed to such climatic shifts especially the Glacial. Some species have, however, developed characters different from the corresponding Himalayan species.

The African, Mediterranean and European elements were driven into the country during glacial and periglacial climates and likewise the Japanese and Chinese elements. Through successive shifts in climates this alien flora moved inland step by step naturalising in course of time. The south Indian hill stations still serve as refugia (nunataks) for the immigrants from the cold climates and the Rajasthan desert is a refugium to the alien dry and arid species.

The knowledge of past climatic shifts can be more precisely built up through the application of pollen analysis to Quaternary sediments. This has recently helped in the determination of climatic shifts from the 1st Interglacial in the Kashmir Valley. And it is now possible on botanical evidence to separate the commencement of glacial epoch from the Pliocene [16]. The sediments of second interglacial have, however, been found barren and this in itself may have climatic bearing. It is hoped that the present lakes in the Kashmir Valley and elsewhere such as Kumaon, Nilgiris etc., may have preserved records of the entire Quaternary climatic fluctuation in pollen grains preserved in their sediments.

Post-glacial lake deposits have, however, given a record of climatic shifts from Kashmir Valley and Kumaon Hills [17]. The sequence is different from the one built up by De Terra and Hutchinson [18]. The dual effect of Man and Climate has, however, made it difficult to separate precisely their individual effects, but an important climatic shift towards the commencement of Neolithic has been found in the western Himalayas. Thereafter the shifts in plant populations are perhaps affected more by the human influence than climate suggesting very likely that no major climatic shift took place during the post Neolithic period. The progressive aridity in climate seems a plausible inference. This, however, may not be in accord with the inference of wet climate during the Indus Valley Civilization from wide drains and occurrence of Rhinoceros, and Elephant etc. and habitations in the Rajasthan desert corresponding to this time, although the lack of humus and the presence of aolian silts points to a drier climate when loessic

deposits were formed in NW India. The discovery of habitation sites along the banks of rivers, amidst riparian plant communities, perhaps explains to some extent the anomalous situation.

The identification of charcoal and subfossil timber discovered from Harappa has led Chwodhury and Ghosh [19] to conclude that about 4000 years ago, there was scrubby forest with pockets of marshy land and tall grasses with rainfall probably limited to a few months in a year. A moist climate can be inferred from *Dalbergia latifolia* which occurs, occasionally to frequently, in the south Indian tropical moist deciduous forest in Mysore and Madras, but here *D. atifolia* is not associated with *Zizyphus* and *Ulmus*, the other two genera discovered at Harappa. *Zizyphus* does occur frequently in tropical moist deciduous forest at Mount Stuart, S. Coimbatore, but the other two genera are missing in this community. Their close occurrence at Harappa is only possible either through the transport of their woods from elsewhere by man or the shift of the southern plant communities to the NW and of Himalayan to the south but supporting evidence for the latter is yet to be discovered.

From the woods identified from Hastinapura, Chowdhury & Ghosh [20] conclude that they do not suggest any pronounced climatic change in the region within the last 3000 years. The evidence is based upon *Dalbergia sissoo* which is a riparian species whereas *Holarrhena antidyssentrica* occurs both in moist deciduous forest and dry deciduous rivarian forest. Both occur in subsidiary edaphic forest types. Likewise plant remains from the Chalcolithic site at Maski comprising *Chloroxylon swietinia* and *Acacia* [21] and frequent occurrence of *Acacia* and *Zizyphus* at other Chalcolithic sites such as Navdatoli-Maheshwar suggest warm and dry climate.

From a study of timbers from Sisupalgarh, Chowdhury & Ghosh [22] again arrive at the same conclusion that there has been no climatic change in the region since about 2000 years. The plant remains *Boswellia serrata*, *Acacia* and *Soymida febrifuga* suggest a *Boswellia* community which thrives in low rainfall (20-25″) on dry hills throughout peninsular India. *Casearia* sp. and *Holarrhena* are not misfits in this community.

Thus a large body of evidence from western, central and northern India suggests that Neolithic and post-Neolithic periods evolved in progressively dry climate. This was responsible for progressive expansion of the Rajasthan desert.

Besides extending help in Chronology, the growth rings in woods also provide evidence of former periods of drought, high precipitation etc.

Ancient Plant Economy

The distribution of cultivated plants and their wild ancestors have revealed that a large part of India leaving a strip in the north west belongs to the centre of origin for rice whereas the north western part belongs to the centre of origin for wheat (*Triticum sphaerococum*). India has also been the home of millets although considered to be a secondary centre of origin. Amongst the other useful plants *Dolichos Phaseolus*, *Cicer arictinum*, cotton are also attributed to India [23]. Several other cultivated plants have been introduced into India through diffusion of alien cultures into the country. The cultivated plants now used in the country can, therefore, provide background information of considerable significance to throw light on the evolution of the protohistoric cultures.

Researches hitherto carried out reveal [24] that *Dolichos biflorus* was an important legume amongst the Neolithic people in the Mysore-Bellary Doab, several carbonised seeds of which have been discovered at Tekkalkota. The Neolithic in South India was also characterised by Millet culture since *Eleusine coracana* has been discovered at Hallur in Karnatak [25].

From the north west indirect evidence of the cultivation of wheat has been found in the

archaeo-botanical material discovered from the Neolithic site at Burzahom [26]. Should the indirect evidence of Neolithic Wheat culture in Kashmir be ascertained in future, it will be interesting to infer that during the Neolithic times India had Wheat culture prevailing in the north west. About the species of wheat (*Triticum*) cultivated by the Neolithic Indians in the NW, we have no idea and we shall eagerly look forward to the archaeologists working in this part of India to unearth and provide the material. Was it *T. sphaerococcum* which is also known to occur wild in this part ? Or was it a progenitor of *T. sphaerococcum* ?

The Neolithic rice from Orissa [27], however, has been referred to *Oryza sativa* which also occurs wild in marshes of Rajasthan, Sikkim, Bengal, Khasia Hills, central India and the Circars [28]. It is of course easy to presume that it was this wild species which was brought under cultivation. But the earlier experiments of the Neolithic folk in determining the suitability of the grain of wild rice for human consumption and transplanting it from its wild habitat to the prepared one must be interesting and fascinating, if they could be known.

The Neolithic plant economy in India was characterised by three separate cultures viz., the Rice Culture, the Millet Culture and the Wheat Culture. It is yet to be established through fresh excavations as to which of these cultures was dominant over the others. Our knowledge of the Neolithic plant economy is still incomplete since besides the three cereals and a legume we know nothing of the other plants used by the Indian Neolithic folk.

The Wheat, Rice and Millet Cultures comprise mature phases of plant economy of the Neolithic and may be assigned to the mid-or late-Neolithic. The early Neolithic, a period of trial and experimentation and the transition between the late Mesolithic and early Neolithic, should serve as a delimitation between the commencement of Neolithic and the end of Mesolithic. The precise recognition of this transition through typology or sections exposed in excavations may be difficult owing to considerable mixing or passing over of the Mesolithic traits into the Neolithic in India. Botany, however, provides precise evidence of this transitional phase through that part of the pollen diagrams where the sporadic occurrence of culture pollen and Cerealia is indicated. The part of the diagram preceding this obviously represents the Mesolithic period and the part succeeding it the early Neolithic. If plant economy is a measure for such a delimitation then the pollen diagrams constructed from NW Himalayas viz., Kashmir [29] and Kumaon [30] have already provided this information. The radio-carbon assay of the corresponding sediments will, however, attest the validity of the delimitation recognised in pollen diagrams. In both Kumaon and Kashmir it reveals the same environment and hence it is of equal antiquity.

Pollen analyses in India may suffer from serious limitations, since the pollen of rice and millets do not fall in the category of Cerealia pollen. It is yet to be seen if the pollen of associated weeds can throw light on their cultivation. This limitation may also affect the distinction between the pastoral activity and farming. The inference of commencement of farming preceded by a long period of pastoral activity from the pollen diagrams constructed from Ootacamund [31] and suggesting the origin of farming in the Nilgiris in the post-Neolithic period, may not be free from pitfalls.

In the succeeding Copper-Bronze Age—the Chalcolithic period—the pattern of plant economy seen in the Neolithic, undergoes a considerable change. The Rice Culture continues and dominates, the Wheat Culture spreads to the entire north India with the easternmost limit seen in West Bengal and in large part of central India. It is not clear, however, if the Millet Culture spread north-westward as seen in Rajasthan [32] or had already existed there. The spread of Wheat Culture inland during the Chalcolithic is an outstanding feature of ancient plant economy

in India. Perhaps the Harappans and later the Aryans share the responsibility for this.

The Chalcolithic wheat belongs to *Triticum vulgarecompactum* type, of which the centre of origin is outside India. The evidence of melon (*Cucumis melo*) at Mohenjo-daro also points to the same, of which middle Asia is the gene centre. How was this diffused into the Indus Valley and who did it ? Wheat Culture here is accompanied by barley also, although only discovered at Mohenjo-daro. The botanical evidence tends to suggest that the Harappan culture has emerged from an influx from the extreme west. Diffusions from the extreme west are also indicated at Navdatoli-Maheshwar [33] by the finds of *Lens culinaris* and *Linum usitatissinum.*

The records from the Iron Age, though meagre as yet, again give evidence of rice and millets. But the finds of gram (*Cicer arietinum*) from Amraoti are an interesting addition to the ancient plant economy of India. Gram is associated with horses which characterise the Aryans. Perhaps the Amraoti evidence is late in history, we ought to discover records of gram from earlier strata and use it as time-marker for the advent of Aryans in India.

The meagre evidence of cotton and silk is from the Chalcolithic and we need to know more of it to infer anything useful from them. The same applies to the oil seeds, though linseed's significance has already been mentioned above. Likewise we need more and substantial evidences to prove pre-Columbian historical contacts of early Indians with the Mexicans to support the insufficient evidence of pre-Columbian maize in India [34]. Perhaps, as opined by Jeffreys [35], maize was introduced into India by the Arabs long before the Portugese entered the land.

Aegilops is ethe precursor of wheat as established by cytogenetical research. Its remains have now been found in Afghanistan from the site Deh Morasi Ghundai dating to circa 3000 B.C. [36]. At other sites the usual associate of barley is wheat but here barley is associated with an ancestor of it. Deh Morasi Ghundai represents an under-developed culture without any contacts with cultural centres in Asia.

The origin of six-rowed barley is still disputed. Diverse opinions exist : its origin from a two-rowed barley or from an extinct six-rowed barley. The Deh Morasi Ghundai find being six-rowed and from culturally isolated site perhaps suggests its development from a wild six-rowed form now extinct. Archaeology thus provides valuable information to solve some riddles in botany and agriculture. We can hopefully look forward to archaeological excavations in the extreme NW of India to recover material of this alongwith that of wheat. The discovery of early and wild cultivated plants will be of added interest to both botany and archaeology.

Although the New Stone Age is accredited for the commencement of agriculture, the Old Stone Age must be accorded due credit for the evidences although indirect for vegetative propagation preceding seed growing. The digging of rhizomes, tubers and other underground parts to provide supply of carbohydrates is the Palaeolithic mode of agriculture. This according to Sauer [37] " assured and increased the reproduction of such plants and did not involve the time-limit for harvest, problem of storage and it was the simplest form of agriculture to supplement and balance his highly protein and fat rich diet with starches derived from roots. Burning and digging provided reproductive advantage to certain plants useful to Man thus leading to profuse propagation and lateration by individual plant selections by nature producing better and useful varieties which could be selected for desired quality by the early Man ".

Past Cultural Contacts

Like implements, plant remains from archaeological sites also provide information of past cultural contacts of pre-and protohistoric folk. The cultivated plants were carried by the people to wherever they went. The diffusion of Wheat Culture into India has already been mentioned.

The discovery of lentil (*Lens culinaris* Medikus), grass pea (*Lathyrus sativus* L.) and linseed (*Linum usitatissimum* L.) at Navdatoli-Maheshwar [38] is highly suggestive of their diffusion into Central India from the Mediterranean and the extreme west of India. The diffusion of *Zizyphus jujuba* Lamk. has taken place into Arabia and Egypt from India [39].

Outside the cultivated plant remains, evidences of the use of wild plants for timber, implements, pounders and coffins have also been found. Some of the plant species identified do not suggest any possibility of having grown in the near vicinity of the site they are discovered from such as *Cedrus*, *Ulmus*, *Dalbergia latifolia* the timber of which was used for coffins. *Cedrus* and *Ulmus* today are restricted to the Himalayas, and no possibility suggests for their former occurrence at the sites of their discovery. *Dalbergia latifolia* occurs in the south and it seems improbable that this tree had extended into the Indus Valley about 4000 years ago. Obviously the timber of these must have been imported from the Himalayas and the south of India. This indirectly suggests the cultural contacts of early Indians with the people in far flung areas within the country and outside.

It seems certain that the knowledge of the property and uses of wood such as the durability, the shock absorbing quality characteristic of *Zizyphus* wood used for making wooden mortars, the high Caloric value and suitability as fuel [40] must have been built up through trial and experience and cultural contacts.

Conclusion

In an outline of areas of mutual interest comprising the dating mechanism, the environmental archaeology, the ancient plant economy, and the past cultural contacts, it has been shown how closely the plant sciences and archaeology are related to each other and how in these areas their aid to each other becomes indispensable. It is needless, therefore, to draw attention to the importance of close collaboration among the specialists of these two disciplines of science. It is hoped that this realization will bring them closer for the progress and advancement of science as a whole and their respective disciplines too. The need for mutual collaborative effort has already been pointed out earlier by Vishnu-Mittre [41].

NOTES

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[3] The oldest known tree is known to exceed 704 years. See P. Maheshwari, 'Flora' in *The Gazetteer of India*, (Delhi), 1965.

[4] 'The formation of Growth rings in Indian trees I', *Indian Forest Rec.*, **2** (1), 1939, 1-39 and 'The formation of Growth rings in Indian trees II', *Ibid*, **2** (2), 1940, 41-57.

[5] 'The formation of Growth rings in Indian trees', *Ibid*, N.S. **1**(2), 1950, 1-27.

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[15] The corresponding rise in maximum temperature during abnormal heat waves is within the range of 5-10° throughout the country. See S.Basu, 'Weather and Climate', *The Gazetteer of India,* I, 1965, 67-116.

[16] Vishnu-Mittre, 'On the Plio-Pleistocene boundary in NW India', *Palaeobot.,* **12** (3), 1963, 270-276 and op.cit. [11].

[17] Vishnu-Mittre, 'Some aspects of pollen-analytical investigations in the Kashmir Valley', *Palaeobot,* **16,** (182), 1966; Vishnu-Mittre and B.D. Sharma, op.cit. [12] and op· cit. [13].

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[20] K.A. Chowdhry and S.S. Ghosh, 'Plant remains from Hastinapura', *Ibid,* **10-11,** 1954-55.

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[41] Op.cit. [11].

A Further Note on the Direction of Writing in the Harappan Script

by B. B. LAL

In the March-1966 issue of *Antiquity* (pp. 52-55) I published a note on the above-mentioned topic. To recapitulate, the note, with the help of the illustrations that accompanied it, showed that the direction of writing in the Harappan script was from the right to the left. The conclusion was based on the evidence of overlap of symbols which had been inscribed on some potsherds.

Accompanying the present note also is a photograph (Pl. I) of an inscribed potsherd, but with a difference. Whereas in the case of the potsherds published in *Antiquity* the symbols were inscribed *after* firing, in the present case they were inscribed *before* firing. Thus, as the clay was only leather-hard at the time of the inscribing of the present specimen, the incisions are bold and deep. This makes it much easier to determine the overlap in the present case than it was in the case of the potsherds illustrated with the earlier note.

The potsherd being broken, it is not known if there were any more symbols in the inscription (cf. Pl. I). As it is, the inscription comprises four symbols. Beginning from the right, the first symbol consists of two vertical strokes, the second resembles an arrow, the third resembles a fish, and the fourth comprises three vertical strokes.

As there is no overlap between the first and second symbols, it is difficult to say anything about the sequence *inter se* of their incision. The same applies to the relationship between the third and fourth symbols. It is only in the case of the second and third symbols that there is an overlap. We shall see a little later what this overlap signifies.

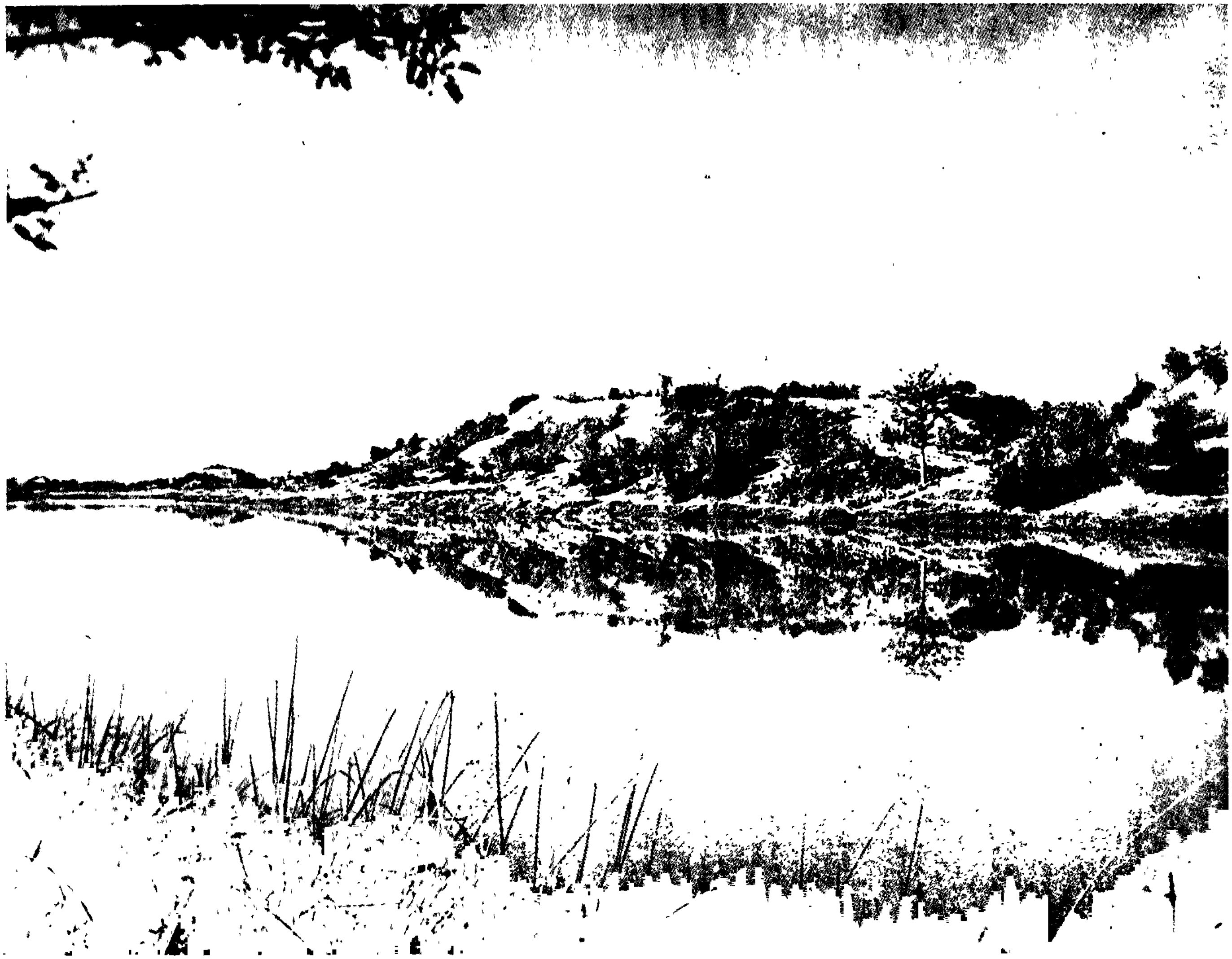
The second symbol, resembling an arrow, consists of four strokes, of which three form a triangle and the fourth cuts the base vertically down. Of the three strokes forming the triangle, it is clearly seen that the basal stroke was drawn later than the one on the left, for the former overrides the latter, though only to a very limited extent, at the junction of the two. As to the relationship between the two oblique strokes of the triangle, it is unfortunate that the photograph does not bring out the overlap clearly. From the original, however, it is clear that it is the left-hand stroke that cuts the top-end of the right-hand one, showing thereby that the former was incised after the latter. That the vertical stroke cuts the basal stroke of the triangle is patently clear. Thus, the sequence of incision of the four strokes comprising the 'arrow' would be : the right-hand oblique stroke, the left-hand oblique stroke, the basal stroke, and the vertical stroke.

Now to the third symbol, resembling a fish. It consists of four parts : two arcs, meeting each other at the top but intersecting lower down, and two oblique strokes forming the two 'fins' of the 'fish'. Of the two arcs, the left-hand one overrides the other, as can be seen clearly at the point of their intersection. That the two 'fins' cut across the two respective arcs is also very clear. As to the interrelationship between the two 'fins', it is seen that the left-hand one overrides, though only partially, the top-end of the right-hand one. The sequence *inter se* of the incision of the four parts of the symbol would thus be : the right-hand arc, the left-hand arc, the right 'fin', and the left 'fin'.

Now to the most important point of the discussion, viz., the interrelationship of the second and third symbols, which provides the clue for determining the direction of writing of the inscription. It is clear from the photograph that the horizontal stroke forming a part of the second symbol *is cut* by the right-hand oblique stroke (the 'fin' of the 'fish') of the third symbol. This evidence establishes that the second symbol was incised *before* the third. It would thus mean that the direction of writing of the inscription was from the right to the left.

Here, thus, is one more example to confirm the conclusion arrived at in the note published in *Antiquity*, viz., that the direction of writing in the Harappan script was from the right to the left. In fact, *the sequence of incision even of the individual parts* of the second and third symbols as detailed above, *also demonstrates a behaviour which is normal only to a system in which the direction of writing is from the right to the left.* This second observation has been possible only because the present specimen had been inscribed *before* firing, which resulted in bold and deep incisions.

An inscribed potsherd.



Paunar Mound.

Protohistoric Chronology and Technology and Ecological Factors : A Synthesis

by D. P. AGRAWAL

We propose a model here which adequately explains available evidence on protohistoric archaeology. An attempt has been made to integrate technological, archaeological and ecological evidence. Any model to explain evidence of a period devoid of decipherable written records has admittedly to be largely conjectural. However, an absolute chronology, based on C-14 dates, provides a firm framework.

India had two main phases of urbanisation : first, based upon copper metallurgy and Indus plains ; second, depended upon iron metallurgy and Indo-Gangetic plains. Doab, because of its impregnable forests, had to await advent of iron to colonise it. First wave of intruders (Aryans ?) could not colonise Doab; only second wave could do it, as it had iron. The conclusions, though subjective, seem, in view of the objective evidence enumerated below, inescapable.

Ecology

In the Indus region neither climate nor ecology seems to have changed much [1, 2]. Indus alluvium was quite soft which would yield to even wooden hoe. Copper and bronze hoes were quite sufficient for agriculture. Rainfall was poor. Even now Panjab has 10″ to 20″ of annual rainfall, though it has an immense sea of underground fresh water. The lower Indus plain has much less rainfall : in Sind it is less than 5″ [3]. Such a climate and soil could support only a sparse scrub jungle and at best a gallery forest [1]. Such an ecology was the right ground to sow the seeds of civilisation. Knowledge of copper metallurgy combined with pliable alluvial plains produced large scale surplus in agriculture which led to the granaries and the cities of Indus, viz., urbanisation and state.

In Rajasthan there is evidence for change in climate and continuous advancement of desert. Three distinct breaks between pre-Harappan-cum-Harappan and P. G. Ware, and Rangmahal are of the order of a milleninum. It possibly agrees with the pattern of climatic change [4].

Ecology of the Gangetic plain has however suffered drastic changes at the hands of man. Constant denudation of forests have resulted in vast alluvial plains.

This region has a good rainfall as it falls within the contours 25″-40″ of annual rainfall. " The soil is meadow type and tropical and subtropical-dry steppe on older alluvium and hard rocks with solonets " [5]. Naturally, a monsoon fed forest grew up. Most of it was covered with sal and other Terai and Bhabur like forests [6]. There is plenty of evidence to show the original vegetation of these plains [7, 8]. More work on Gangetic fossil pollens is afoot [9]. Even as late as Moghal times there were sizeable forests as is evidenced by their hunting expeditions. The fauna included carnivores, monkeys, elephants and ungulates [6].

Literary evidence of the Epics also confirms the presence of primeval forests in the Doab [10]. *Satpath Brahmana* [11] mentions the advance of *Agni* eastwards upto *Sadānirā* (modern Gandaka) enabling Aryanisation of Videha. Basham [12] says, " the main line of Aryan penetration was not down the river, the banks of which were then probably thick swampy jungles, but along

the Himalayan foot hills". Forest clearance by fire is possible only in the foot hills. Iron was needed for clearance and agriculture in monsoon forests [13].

Thus we see that evidence of flora, fauna, soil, climate and literature point to the thick monsoonal primeval forests in the Doab. Unlike the Indus which flowed largely through a desert, Ganges and Yamuna passed through thick and deep forests and swamps. The Doab alluvial plains are a result of man-made deforestation in the course of several millennia. We would see the role of this primeval forest barrier in the spread of black-and-red ware.

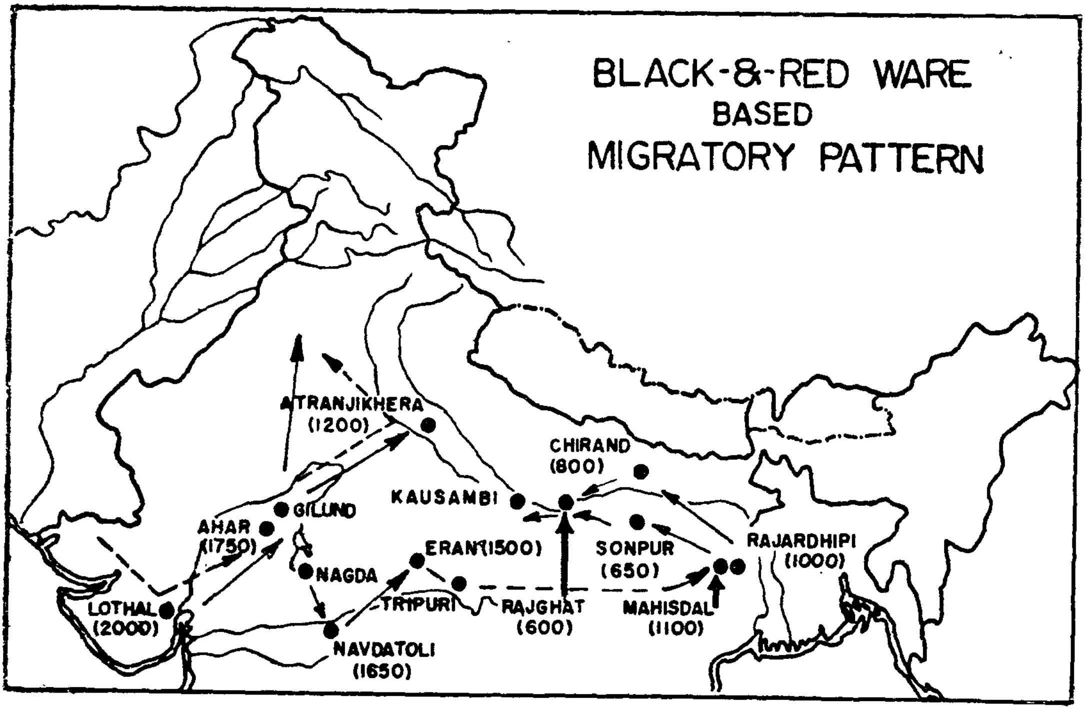


Fig. 1. Probable routes of migration of black-and-red ware. Numbers within brackets are average radiocarbon dates in years B. C. based on 5730 years Value. Younger dates of Rajghat show that they received the impulse from the east rather than the west.

C-14 Dates and Chronology

Before we discuss technology, let us define the chronological framework. To date, about 300 C-14 dates are available [14, 15]. Problems of chronology have been discussed by several workers [16 to 22]. We can safely infer now from the available C-14 dates and archaeological data that there is a clear temporal succession of Pre-Harappan, Harappan, Banas, Malwa, Jorwe, P. G. Ware and N. B. P. Ware cultures. Neolithic of the South, as also of Kashmir, in their start, are roughly contemporary with Harappa culture. Megalithic culture of the South, from the few C-14 dates so far, appears to emerge around c. 900 B.C. However, we know practically nothing about the chronology of the northern and eastern megaliths, nor about the eastern neolithic.

Still, finer points of chronology need more work. Recent dates [23] from the latest phase

of HR area of Mohenjodaro and Kalibangan[24], though conforming to shorter time-spreads of Harappans, may indicate, different—though overlapping—brackets for nuclear and peripheral zones. In this light, Raikes' [16] idea of succession of Harappan capitals looks quite plausible. However, with errors as large as ± 100 years and probable C-14/C-12 minor variations in the third millennium B. C., greater precision at this stage would not be warranted. These problems will be discussed elsewhere [25].

The germane point to our discussion here is the following of Banas culture in the wake of the Harappans. Though a coexistence in point of time of Harappans in north Rajasthan and Banasians in the south—at least for some time—is not improbable. What is more interesting is the distribution of C-14 dates of these early black-and-red ware sites. A look at Fig. 1 will show that a wave is going northwards to the fringes of west U.P. and east Panjab. The other spreads through central India to West Bengal. This pattern is delineated by the gradually younger C-14 dates on the northern and eastern routes. Such a spread would readily explain the late dates of east U.P. and Bihar. As discussed earlier, the dense forests came, in the way of both these waves as a result of which they recoiled westwards (Fig. 1).

P G ware appears around c. 1000 B.C. (we have only one C-14 date for the early phase though) and overlaps with N B P ware (c. 500-50 B.C.).

We will discuss technological factors below and then we will see how this chronology helps to understand the protohistoric migrations.

Technology

It is agreed that copper metallurgy was quite advanced in Harappa culture [26]. There are several chemical analyses available which show that they did deliberate tin and antimony alloying. They had developed techniques to extract pure copper (upto 99%) from probably chalcopyrites. Problem of correlation with ores is much more complex than the facile claims made by analysts so far. The author is trying to use modern statistical approach to ascertain the types of ores used. Pinpointing of actual mines will require much more work by many workers and willing co-operation of the collectors.* Metallographic analyses are also underway and show definitely that annealing, cold and hot working, closed casting etc. were known to the Harappans. Probably techniques of raising, hollowing, riveting and "running-on" were also known. Copper was never a cheap metal and never in abundance at least in India. Continued use of chert blades indicates costliness of metal. But the prolific copper-bronze repertoire of Harappans does show their access to rich ore deposits for the demand of those times. They even had a true saw which does not appear elsewhere till Iron Age. For agriculture on the pliable fertile Indus alluvium, however, copper hoes, sickles and knives were sufficient.

As pointed out by Fairservis [2] a symbiotic balance was attained which led to proliferation of cattle. The preponderance of bulls on seals and terracottas is a reflection of the recognition of cattle-power. The origin of sacredness of cattle in India may have an origin in the Indus. Harnessing of energy is an essential factor for growth of cultures. Use of cattle-power for agriculture and transport on a large scale was certainly an intensifying factor in the Harappa culture. Rivers too were used for nevigation. Sites like Sutkagendor and Lothal do point to maritime trade.

* For any meaningful and valid conclusions about ore-correlations, it is necessary to have a large number of analyses. With the present techniques available in India, it is possible to do chemical and metallographic analyses without disfiguring or cutting chunks from artifacts. Even milligram quantities are enough to permit full chemical analysis. Spot-polishing enables metallographic analysis without cutting an artifact. It is hoped that Inidan museums would also follow British Museum where such analyses are not only permitted but encouraged.

The surplus produced led to the development of specialised crafts ; because the society could now provide food for their skills. A technological base for the first phase of urbanisation was ready. Evolution of classes, state and civic life were natural concomitants.

Ghosh [27] has seen in many pre-Harappan cultures of Sind, Panjab and Rajasthan a substratum for rise of the Harappans. Quantitative changes were definitely due to these precursors, for these pre-Harappans had the requisite technical knowhow : metallurgy, fortifications, use of cattle and wind power. At some stage this had to give rise to a qualitative change—the urban Harappan society was bound to come. May be it was accelerated by a foreign impulse or an " idea-stimulus ".

Again, the story in Doab was much different. A sprinkling of Harappan sites on the fringes of Doab may indicate either their outposts for importing timber or may be refugee-settlements. What is pertinent is that they failed to colonise Doab to grow into cities. Harappans could survive all their migrations upto Doab, because western India was ecologically one unit; but their socio-economy, their urban culture,withered as soon as it entered an alien ecology of Doab. Despite large number of known Ochre Coloured ware sites, they have nothing of urbanism. In fact, Ochre Colour ware deposits so far encountered have consistently been of a detrital nature. Was it due to a huge deluge ? If yes, any red pottery after the deluge would look like O. C. ware.

Copper Hoards [28, 29] are still an enigma. They are a conglomerate of ill-assorted artifacts. How many tools belong to a particular culture, with definite space-time-spread, is a moot point still. Their tools, however, have a hunting bias with their developed harpoons, heavy axes and even anthropomorphic figures which could have served as missiles or boomerangs (?) (their structure, blunted heads, and externally sharp wings clearly indicate it). Their harpoons are hallmarks of their developed casting skill as also their knowledge of alloying copper with tin [30]. However, many more analyses of tools and ores are necessary before we can say something definite about them. But for large-scale agriculture and clearance of thick forests copper artifacts were no answer. Absence of large settlements of Copper Hoard and O.C. ware cultures are a pointer. In fact, most of the reported Copper Hoard sites are marked by lack of any mounds. Complete absence of any pots or pans of metal, out of more than a thousand Copper Hoard artifacts, may indicate hunting-nomadic life.

To break kankry soil of Doab and to clear monsoon jungle what was needed was use of iron artifacts on a mass scale. It is not surprising therefore that first colonisation of Doab is due to iron using PG ware people around the beginning of I millennium B.C. Whether they used local ores for fabricating iron tools only further work on technology of Iron Age in India will tell. Alternatively, they could have brought their tool kit along with them. Forging and reshaping of old tools could be done by a smith but extraction of metal was an involved process. And how long it took for the PG ware people to acquaint themselves with the terrain and look for local ores is a moot point again. And when did carburization of iron to make steel start. To answer these questions we need technological studies and not only typological catalogues of metal artifacts. A large number of PG ware sites in Doab bears eloquent testimony to the successful colonisation of Doab by these people. Iron technology alone was an answer to Doab colonisation.

Problems of Iron Age in India have been dealt with exhaustively by Banerjee [31]. However, complete absence of technological studies therein leaves many problems where they were. Tandon [32] in his recent paper has laid emphasis on the technological aspect of the problem.

Unless we can prove that PG ware people were smelting local iron ores to forge their tools, one cannot hold that Iron Age in India

was brought by them. The real superiority of iron on bronze does not lie in hardness and strength, but in its abundance. Advent of real Iron Age should be dependent upon smelting of local ores and its impact on the economy. To us it appears that the advent of real Iron Age coincides with the second phase of urbanisation with its locale in the Doab. Iron, when it was plentiful, could be used for large-scale jungle clearance and ploughing of the tough Doab soil. This naturally meant surplus food production, increase in cattle-power, quicker transport, river-navigation—all leading to growth of cities.

NBP ware has an epicentre probably in Magadha, an area where iron was available in abundance in an easily smeltable form [33]. PG ware in the Doab is entering from the West. But the transition between the two is smooth, in fact many of the NBP shapes follow PG ware. Besides, many red ware shapes are commonly associated with PG and NBP wares [34]. And growth of cities coincides with the emergence of NBP ware. To us this evidence suggests that use of Bihar iron ores alone could make the use of iron on a mass-scale feasible for complete urbanisation of Doab which gave rise to the first cities. Despite the iron tools of PG ware people and long time-spread, their settlements are very poor. Urbanisation was a far cry. It could probably be due to non-utilisation of local ores by PG ware people. The revolutionary power of iron lies only in the fact that it is most abundant and cheap material which could be used by common man. Comparatively, copper and bronze were never very abundant, especially in India.

These questions will remain in the realm of speculation so long the excavators do not encourage analyses of excavated metal artifacts. Today, technologically-biased investigations can go a long way towards the re-construction of protohistory; in fact, they are a desideratum.

Finally, a few words about Banas Culture technology.

Hegde's excellent work [35] on Chalcolithic metallurgy has given us a fund of information. Such studies on much larger scale and by many more workers are required. Banas Culture people might have sed Khetri ores as agreement in impurity patterns of the ore and the artifacts shows. Though they know smelting of ores, their casting is very poor. Knowledge of tin and antimony alloying is also not attested. Their copper tool-repertoire is of an inferior variety and obviously no match to the challenges of Doab colonisation.

Black-and-red ware is produced by an inverted firing technique. This technique in India is first observed amongst Saurashtra Harappans. From there it seems to have gone to Banas region. One wave of it goes to the north (in Panjab also black-and-red ware has been reported from several sites [36]). But they cannot penetrate deeper in the Doab. The other wave goes via central Chalcolithic sites to West Bengal and then recoils back to Bihar and eastern U.P. Bases of assuming this route for black-and-red ware are two : first it is suggested by radiocarbon dates (Fig. 1); second, specialised techniques have greater probability of diffusion than independent invention every where. A look at Fig. 1 will show that some barrier had to be faced both by the northern wave and the eastern wave. That barrier could only be monsoon-fed dense forests. That explains the late dates of Rajghat, Chirand, Sonepur black-and-red ware, as this impulse covered a longer way (from west to east, then after recoil, from east to west) both in terms of time and space.

There is a sprinkling of black-and-red ware in some late neolithic sites too. Like black-on-red ware, black-and-red ware too was wheel-thrown and technologically is an alien trait in a hand-made pottery-complex. So both these wares are obviously intrusive in a neolithic milieu. In fact, in Tekklakota black-and-red ware has been called an import by the excavator [37] though the ware appears to him as made on a tournette.

So in a neolithic milieu occurrence of black-and-red ware shows at best contacts with Chalcolithic cultures of the north.

The equation of Banas culture with early intruders (Aryans) was based on their geographical and chronological vicinity with the Harappans, as also cultural borrowal from the latter [38]. Their west Asian affinities have been discussed by Sankalia in detail [39]. So if this was the first wave of Aryans, it never penetrated deep into Doab. Gaur [40] has raised interesting questions and seems to agree with the view that black-and-red wave were the early Aryans and P.G. ware later post-Ṛgvedic Aryans. Lallanji Gopal [41] has convincingly shown that "Ayas" in Ṛgveda only means metal and not iron.

Synthesis

Wheeler [42] in his characteristic lucid style has described three inevitable stages in all scientific investigation : "The first stage is one of limited knowledge and restricted inference (often wrong). Upon this follows the accumulation of scarps of evidence which tend to constitute an untidy and incoherent heap. Only, later, when this heap has sufficiently grown and matured, does it begin to take an assured place in the landscape." In 1958 he described Indian archaeological investigation in the "untidy heap stage". But in 1967, we can safely continue the great efforts of the late Subbarao in giving shape to this now grown-up heap of data. Attempts in this direction have already been started by Ghosh [27], Wheeler [21], Sankalia [43], Lal [20], Kosambi [33], and others [31, 32, 38, 44].

About interpretations, Piggot [45] said "The model will be a 'true' one in so far as it does satisfactorily account for the phenomena, but you can have more than one model at a time, all 'true', and the devising of a new model does not mean that all the others have to be scrapped, though some may have to be abandoned or drastically modified in the light of new thought". This is true of the model proposed here too.

There are still many obscure points, apparently contradictory evidence even. But to bring order into the chaos—the "untidy heap"—of data one has to put forth their synthesis—models—which could be precursors of more 'true' ones.

To summarise : India has witnessed two major phases of urbanisations : one about the middle of the third millennium B.C.; the second about the middle of the first millennium B.C. For the first phase the stage is set by the pre-Harappans which culminates in the Harappan civilization. Whether the Harappans represented an exotic impulse which accelerated the process of urbanisation is still a moot point. Its technology is copper and bronze based : and the fertile land is provided by the tender Indus plains.

Harappans did not have a far-flung empire for a millennium. It is probably a gradually shifting empire from west to the east and the south under pressure both of folk migrations and natural agencies.

Black-and-red ware migration may indicate the spread of early Aryans, typified by Banas culture. They could not penetrate and colonise Doab or Sunderbans because of thick monsoonal forests for which the copper supply and technology was no equal. They spread in two waves: one going to north which deflects from the western Doab to spread into east Panjab, the second goes to West Bengal via central India and recoils back from the Sunderbans to spread to Bihar and east U.P. There is a possibility of early Aryans and Kalibangan Harappans partly coexisting in time without interaction. Such a migratory pattern is supported by C-14 dates and ecological considerations.

Copper Hoard problem is still an enigma. But their hunting tool kit, abundance of metal and developed alloying and casting technology shows that they may be much later in time. Unless authorities allow more analyses of Copper Hoards, this problem will indefinitely be discussed subjectively.

PG ware, possibly representing the second wave of Aryans, started the colonisation of Daob

with their iron technology. To clear thick forests and cultivate the kankry land only iron tools were an answer. But due to either the lack of ore extraction technology or ignorance of Indian iron ores, real Iron Age had to await till NBP times when plentiful supply of easily smeltable Bihar iron ore was available. Iron when used on mass-scale alone could produce requisite surplus to usher in the second phase of urbanisation resulting in the growth of the first cities in north and east India towards c. 500 B.C. If the foregoing is correct, then occurrence of cities in Doab at c. 1000 B.C. or before would be both incongruous and improbable.

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The Changing Face of Archaeological Studies

by K. V. SOUNDARA RAJAN

It was in 1863 that Robert Bruce Foote discovered the first palaeolithic tool in India in a quarry pit at Pallavaram, and soon after displayed it to the yet rather sceptical and smug antiquarians of Europe, stirring them out of their complacence and widening their ken. A hundred years later, prehistory—now a *prima donna*, has indeed broken new grounds and, without remorse or recriminations, is divorcing her quondam hero the taxonomist, and plighting her troth with the sociologist-cum-statistician—the refined technical co-respondent. Perhaps it was well, but lest we might be throwing the baby along with the bathwater, we would do well to narrate the pace of events that had led to this rather exciting development.

To begin with, it would be appropriate to outline the primary objective in Prehistoric researches dealing with the origin and early vicissitudes of the human species. The earliest subhuman primate—the hunting man—was undoubtedly the product of the indefatiguable researches of palaeontologists working in close collaboration with archaeologists. Together, they have pieced out the scattered vestiges of bone remains of these early ancestors of ours, and presented them in the best manner that stratigraphic archaeology has taught them. The search had indeed been hard, frustrating and prolonged. Even now, we have a large part of the world practically unmanned—is so far as the original authors of the countless tools found in the implement—bearing strata of valleys, uplands, river banks, cave fronts etc., are concerned. India is one such region. There is not even a promise yet of any fruitful end of the journey in this direction, save for a more concerted attempt in the cave sites. All the same, none denies that the door is wide open yet and given the proper orientation and the tools for attack, the objective could be fulfilled sooner or later. For, it was the tools that created civilization ultimately, and it is in the selection and coordination of the tools of attack that the best chances for survival for archaeologists exist. The tools, that Prehistoric Stone-Age forebears, used have themselves become the subject of a widespread diversity of interpretation. The approach even has differed, one group of scholars addressing itself to the task of refining the typological criteria and differentiae; another, applying the 'functional' norms to the artefact groups; and a third, isolating the vocational or sociological unit from the plethora of tool types to be found in a given site. Of one thing, however, we may be certain. All these three categories of workers do not envisage any divorcing of the tools from their locale, and very strongly prefer *in situ* investigation. The ethnologists and archaeologists are today jointly seeking explanations for the range of cultural differences and similarities documented for the past and present in other countries. The archaeologist perhaps is, *prima facie* not in need of developing methodology for documenting all the formal characteristics of the human groups observed by the ethnologist, since at the distance of time where the former is operating, specific sophistication in 'social order' might not have been well established. But we must at least concede that any observations, which are of a crucial character in interpreting the true ethno-cultural situation of a given tool-using community, are not lost sight of, either by underdocumentation of the environment, or the overelaboration of the typology. The problem is essentially one of reconstruction of dependable 'models'

for testing the relationship between material and behavioural cultural phenomena. Here perhaps the ethnographer and the orthodox archaeologists and scientific prehistorians can operate on their own individual or specialised spheres, but come to each other for cross-checking the structural terms of the totality of the primitive society they are all seeking to rebuild.

In India, the situation, briefly stated, is that of the Prehistoric archaeologist on the one hand, and the ethnographer and sociologist, on the other, functioning in almost complete isolation, with the result that firstly, the former is totally unfamiliar with the standards of approach and viewpoints of data-processing that the latter is engaged in; and complementarily, as it were, the latter is almost totally unware of the bulk of field investigations and their qualitative character that the former is carrying on. The anthropologist in India is perhaps the one that is likely to overtake (and perhaps overrun) the Prehistoric archaeologist in the task of systematising the rudiments of Stone Age Culture—reconstruction soon, unless the Prehistorian is assiduously widening his parameter, and integrating his inferences with those of the anthropologist. Currently, however, anthropology in India is almost exclusively directed towards ethno-sociological investigation of tribes, races and exclusive groups, both primitive and modern, and Prehistory is only a fringe interest. Correspondingly, a good grounding in palaeontology, Sociology and Botany is not yet considered as the orthodox pabulum of a prehistorian. In fact, collection of tools and a typological categorisation of these, largely often on subjective standards, are the rule, and no basic qualifications have been insisted upon for a serious academic development of Prehistoric studies. Doubtless, geology and its stratigraphical and fossil concomitants have been much fancied as a desideratum, and this is indeed quite realistic. But as we tackle the problem, we are bound to realise more and more that the reconstruction of very ancient Stone Age societies, particularly in a country like India where the largest number of sites are of the open-air station type on the river banks, could be frustrating and, indeed, like venturing into an unchartered ocean without map or compass. There is no need to be unduly pessimistic about it, but as we grow out of our adolescence in these studies, we may as well learn our lesson and improve the 'methodological' problem of accurate data-computation, which would enable us to feed our fellow workers in the ethnographic, and sociological fields with precise observations. While dealing with the pattern of life in old Stone Age, dealing as we do with 'hunting man,' we are left with three varieties of his vestiges : habitational, equipmental and behavoural. The first, where we are provided with a reasonably convincing accumulation of his occupational rubbish and trivia, would involve a conscious assessment of the importance of each of these items, *per se* as well as in a probably mutually coordinated or isolated relationship. We shall come to this aspect again later.

The second deals almost entirely with his tools, their variety and intensity of incidence. It is here that the archaeologist particularly had his greatest wealth of data, and the functional classification of the tools permitted also comparison in space and time, by their own technological refinement and stylistic bias, as related to the environment that has been deduced or presumed for the hunting man from Early to Middle Stone Age. It is here that the raw material also played a significant role and allowed valid investigation into the nearest useful sources for the same, apart from the reflection they cast upon the geographical and ecological factors. But stylistic attributes could not be read into early Stone Age tools always, because of the limitations of the technique of tool-making implicit in the context, when we realise that almost the entire span of nearly 200,000 years of early Stone Age, the range of techniques involved in tool-artifice was a'direct knock' and 'resolved flaking' in so far as a body-trimming is concerned. The Middle Stone Age, however, markedly differed from the

early, by the diversification of stylistic as well as technical criteria, and a differentiation of task-performance could be recongnised in the process. What more, there appears also a fixed locus for the varieties of functions performed namely skinning, scraping, roasting, eating etc., as reflected in the grouping of the vestigeal remnants in a given site. This standardization of the diurnal pursuit of man was not evident in Old Stone Age where man—like the animal he hunted—apparently did not have a customary or habitual habitat and also traversed long distances, stalking, trapping, killing and collecting his food and was thus primarily peripatetic and unstable in daily routine. All the more so in India. Further, the great scatter of his tools and other personal and hunted objects introduce a minimum of probability of a well ordered survival of his activities in a given tool deposit of a river. Lacustrine deposits are,doubtless, the most ideal in this respect but the very recurrence of lacustrine deposits has a direct significance in the character of the climate and topography where he lived, and would be sharply variant from the category of other open air riparian sites. The dispersal element in his remains,thus,is a great disadvantage and in a tropical country like India, the chances of survival of animal and human bones, even under the ideal conditions of preservation are meagre. On an African analogy, experiments made in a deliberately well preserved animal skeleton packed in a wire-netting (to prevent consumption by carnivora) and allowed to be exposed, showed almost total decay of the bones within a few years. Thus, the open-air sites of India have a slender chance of preserving the old Stone Age skeletal vestiges alike of the predatory man as of the animal, not to mention his wooden or bone equipment. We do have, however, fossils of the Bos and Rhino, Elephas etc. in the mid Pleistocene fluviatile deposits, and if they mean anything, their anteriority in age to human remains will have to be presumed. The chances, of course, are least in a lateritic area due to the destructive nature of the ferruginous matrix. Ultimately, our main sources of fossil human and animal remains associated with the tool-making early Man or his own anscestor, should be in the calcarious deposits in the cemented gravels of fossil river beds, not subjected to water movement and having had prolonged subareal as well as sub-terranean consolidation.

The third mode of investigation, namely, behavoural largely made possible in Europe owing to extraordinarily well preserved sites of early human habitation, mostly in caves but elsewhere as well, comprises the scrutiny of the behavoural pattern of activity of the hunting man in his habitat. This study, may it be said, is yet in its formative stages, because the data that it uses, for the time being, are the mass of materials that orthodox prehistorians have unearthed from these sites. The difficulty in excavating intensively a fresh site is explicit and thus it has been accepted on all hands that a wide sampling of all the sites already located and extensively but not totally excavated, should yield a more educative, and wider perspective of the space-time-function co-efficients could be arrived at. Bordes, the French Prehistorian, made a significant contribution in this direction in the 'Mousterian' complex. This itself has been more empirically widened for a consideration of the nature of the socialization process by American specialists and the stylistic differentiation of socio-cultural groups and sub-groups attempts at the definition of the number and nature of tasks undertaken by prehistoric groups.

However, we have yet a lack of systematic 'frame of reference' in organising the artifactual materials for formulating the cultural pattern of these ancient societies. In this connection, it is significant to remind that certain inconsistencies exist in the fundamentals of our way of treatment of the materials on hand. A tradition had been established since early this century wherein the archaeological materials have been defined and ordered in terms of the so-called 'fossils directeurs'—qualitatively, wherein, the restricted stratigraphic distributions over time were consi-

dered as *ipso facto* delineating major cultural divisions, with evolutionary stages implicit in the process. This is particularly true of India where we have still to depend largely upon stratigraphic succession of certain tool materials in even those adventitious localities where a reasonably workable stratigraphy exists. The fact that even in proto-historic or historic archaeology, vertical digging has never been, truly speaking, believed to be a dependable substitute for, horizontal or spacial correlations, is equally applicable in Pre-historic Stone Age contexts as well.

Thus, Stone Age stratigraphy could not, directly lead to an understanding of the evolutionary cycle of artifact techniques, stylistic growth, or functional diversification. We have ultimately to fall back upon spatially well preserved sites and in this respect perhaps the terrace gravels have a greater potential for statistical assessment than strata materials. Further, we have had no beginning yet made in India, in a spacial assessment of a given area of gravel and tool scatter, not to mention, other functional correlates of the tool-types involved. A well organised team with a balanced representation of the archaeologist, geologist, ethnographer and statistician is truly the desideratum, in undertaking field studies in favourable localities. Climatic studies or pure stratigraphic data not involving artifactual remains would be strictly speaking in the sphere of pure research, to be undertaken by universities and specialised laboratories of the Government to emphasise the isolated and particularistic character of these categories of evidences. The archaeological, ethnographic, demographic, functional and social aspects of the study of a given assemblage should be coordinated, on *in situ* localities, while the progress otherwise made from time to time in all these individual disciplines, on their own fundamentals, could be used as a stand-by for eliminating avoidable errors of interpretation or overemphasis. To quote an example, even the palaeontological approach is considered by some of the contemporary Western archaeologists as grossly underestimating the complexity of the archaeological record. This was on the basis that the minimum excavation of the palaeontologist was in a major depositional zone which incorporates a number of distinct occupation levels. The sampling procedure emphasised largely the recovery of the type fossils whose diagnostic value had been predetermined, and in this process the cultural integrity of a given stratum was more or less taken as determined by the presence or absence of such diagnostic type fossils. This has led to the most recent studies as the one instituted by Movius and his associates at Abri Pataud at Les Eyzies, where the excavation is directly oriented towards the isolation of the settlement patterns and reconstruction of the ecological context of the concerned Upper Palaeolithic societies.

'Multivariate' Statistic techniques are employed in such ventures for systematically defining the role of each of the associative materials in a stratum, whether intentional or accidental, to the functional or vocational pattern of activities of the societies which lived there. Such sophisticated techniques which, no doubt, call for the most careful plotting, documentation and retrieval *in situ* of the material, and their gross definition and categorization, would not be possible in India for some time, alike for the lack of adequate sites where they can be checked, as for the lack of the academic climate where such a coordinated endeavour between prehistoric archaeologists and statistician—sociologists could effectively function. But it would perhaps be prudent to adapt our techniques early to the prevailing trends in other countries, in order to get the best assessment of our own cultural material. Science congresses should be the forum that could formulate pioneering investigation of such programmes, and the responsibility perhaps rests equally on the statistician-sociologists as well as the archaeologists themselves.

By and large, analytical methods for establishing correlatable models and standards, both stylistic and functional, should be the best fitted tool in the hands of the Prehistorian for classification and the isolation of attribute-clusters,

rather than coordination of stylistically allied assemblages, and such should be the method of assessing any given distribution. It is said, for example, that if a particular type of scraper is said to be popular, it should be measured in terms of the frequency of the other scrapers, and it would be completely unaffected by the other tool-types like burin or points. Thus seriation techniques and what are called goodness-of-fit-tests for determining the role of the sampling error of the frequency variations are to be plotted for each pair of assemblages, and indexed in the seriation matrix.

All these, of course, are scientific analyses applied upon humanistic groups, and their utility has its own limitations. But none can gainsay that the perspectives they open out for an analytical loci and range of diurnal activities of a given hunting or more sophisticated groups would be the most refined and specialised tools for the operation under considerations.

In so far as the Protohistoric period is concerned, we are equally impressed by the advent of new approaches towards not only the refinement of the dating apparatus, but also in the enunciation of the corporate character of the different antiquities unearthed in each stratum. We are giving more attention to the organic pattern of life that should be eked out of the apprantly discrete artefactual and other material remains. Hearths, grain silos or storage jars, and samples for the climato-botanical reconstructions are given specific and expert scrutiny. Of course, in the early years of archaeology too, the excavators showed this particularised location of activities in a given site in the different buildings unearthed. But the rather disorganised character of the basic stratigraphic standards prevented the critical assessment of the very diversified antiquarian remains that the excavators assiduously documented. This defect, however, has been eliminated in standard excavations in recent times and the cautious and sensible method of measuring the loci of antiquities and strucures has been given a high place.

All the same, one of the most recurrent features of excavations in recent years is the unduly heavy emphasis laid on the vertical sequence of cultural vicissitudes, and comparatively lesser implementation of the horizontal distribution of material vestiges, even among the individual trenches of the small scale, slit-system of trenching. No doubt, financial viability and competence of trained technical personnel are at the root of a successfully executed excavation project. But it would not be economical to let slip the highly ephemeral spacial distribution of antiquities in a given stratum and trench—thus permanently missing the 'role' they played in constituting the 'fossils' of the temporal activity of the given trench or area. Certainly, there was nothing in the book that dissuades the excavator from keeping as rigid a documentation, stratum by stratum, of the horizontal spread of vestiges in each trench, as possible. But it is nonetheless true that such records are scarce. Needless to say that in the ultimate count of material remains (of both significant and nondescript categories), these records—or perhaps the lack of these—would matter a great deal. Indeed, the modern method of computer-analysis of the room to room and house to house distribution of material varia of evidentiary character in excavations, followed in the west, notably in the U.S.A., is fundamentally upholding this healthy dictum that a habitation site is, not by any means, an orderly display of certain significant antiquity—categories alone, and that what the eye misses might often be what is the most vital part of the drama enacted in any given trench or locale.

This would only mean that excavations when conducted on a large scale, should follow the rule of hastening slowly and trench to trench documentation should be thorough. Also, it should not be far too unwieldy for the Director of excavation to be physically unable to be a witness to the fresh developments unravelled in the various digs of the site. In point of fact, horizontal digging should not be progressing all over the site simultaneously, but only in specific

areas, and this should itself have a strictly controlled proportion to the vertical digging going on elsewhere in the site, the latter being equal to, if not much less, than the former quantitatively. The field programmes of the Archaeological Survey of India are, of course, the best models of well-organised digging. Even here, however, there is infinite scope for presenting the layer by layer physical nexus of the antiquities instead of merely a numerical categorisation and count of them. Obviously, photographic and draftsman's labours in these directions would increase by such an approach, but would be eminently worthwhile if we are not to miss the trees that constitute the wood. It would almost be impossible for us to visualise the total range of material culture of a past society, if we do not discern the pattern of activity which they had left in their habitat. *The material culture of a given site is certainly something much more than the sum total of the materials of that culture.* The greater the mapping of the spacial provenance of the habitational debris and debitage organically, alongside finished or finite vestiges of art or craft or functional activity, the greater is the scope of success in eventually reconstructing the past of such ancient and sometimes dead societies.

The various scientific methods used today for data-processing and date-fixation are : C-14 or Radio carbon dating; Thermo-luminiscence, Potassium-Argon (K^{40}-A^{40}) dating (mainly applicable to ranges of millions of years, due to the long life of K^{40}); fission-track dating used in the dating of the Pleistocene Olduvai Gorge bed I in East Africa); Resistance apparatus like proton-magnetometer or Flux-gate magnetometer, for detecting structural vestiges in a given site before hand (as evolved by E.T. Hall and Aitkin at the Archaeological Research laboratory at Oxford); or analytical techniques like Activation analysis (useful for ancient pottery and metals).

Of these, we know that by far the most popular at present in most countries is the Radio-carbon dating. But recent investigations of the data supplied by this method have revealed that there could be scope for corrections not only for C-13 but also for the reaction of atmospheric constituents like cosmic-ray-intensity-difference in balance between atmosphere and oceans etc., on the sample. Besides, the preference for one half-life unit or the other is also a source of mutation. The half-life 5730 (that of Pennsylvania Institute) is considered by some as the present best estimate. Calculation by this is found to be 3% greater than that based on 5568-year half-life, as preferred by Libby. A serious drawback of this method is that the matter of association of *sample* with the *event* for which the date is wanted. This casts the primary responsibility on the archaeologist alone, to be unusually precise and thorough in its seriation of the data.

The Thermoluminiscence method is reasonably the best for pottery samples, whose horizon-makers they can become, and an obvious advantage of this technique is that, by the very principle on which it is based, recently fired ceramics or freshly cooled lava would show no Thermo-lu miniscence. It has been employed in Iran, Italy and U.S.A.

The Potassium-Argon datings most successful implementation is in the determination of the age of 'Zinjanthropos' discovered by Dr. Leakey at Oldwai, East Africa. It has been well upheld by the other independent evidences like Fission-track dating technique of Oldwai bed I.The limitations of the technique comprise in their applicability only to glasses with high uranium content.

In the Resistance appratuses, one *prima facie* inadequacy is their being unsuitable for detection of features of more than two metres below ground. The Proton-magnetometer and the improved Flux-gate magnetometer based on 'anomalous' readings involve the problem of interpretation of these readings as detected by the instrument. It is also being discovered that on certain types of terrains involving pockets of magnetic soils, these instruments are not suitable.

The other modern techniques like Neutron activation analysis, X-ray fluorescence, optical

emission spectrometer, Beta-ray-back-scatter meters etc., are all babies of the post-war nuclear research development era, and it could thus be hoped that these would be rapidly improved for application to archaeology in future, making archaeology grade into its nuclear era, and doubtless, giving a new and sensational face-lift to archaeological research itself. This is not to mention, however, that notwithstanding all these technically advanced tools for absolute chronological computation, a sound, orthodox and thorough-going stratigraphic archaeologist, *with a bias for pdinstaking horizontal digging*, would continue to remain well nigh irreplaceable, but well open to coordination with the contemporary sophisticated scientific advancement.

Burial Practices in the Neolithic Cultures of South India

by PURUSHOTTAM SINGH

Recent archaeological excavations of several neolithic sites in South India have furnished some details about the life of the people inhabiting there.

These neolithic folk were pastoral-cum-agricultural community and occupied sparsely wooded hills. The people live in small circular huts as suggested by the discovery of post-holes at Brahmagiri, Maski, Tekkalakota, Sangankallu and Hallur. The house-floors were plastered with clay, dung and lime. They practised agriculture and tended cow, bull, goat, sheep and buffalo. These people used polished stone tools and pottery made by hand in the initial stages but later they used those made on wheel. Stratigraphically, two stages of neolithic culture have been found. The first stage of this culture is represented by Piklihal IA, Sangankallu IA, and Brahmagiri I A and has been termed 'Lower Neolithic' or 'Pure Neolithic'. It is totally devoid of metal tools. The succeeding phase, represented by Brahmagiri I B, Sankankallu I B, Piklihal I B and Maski I shows intrusion of copper and bronze tools in a limited quantity but without affecting the neolithic economy of the people. The pure neolithic culture has a date-range of 2300 B.C. to 1550 B.C. as derived from the radiocarbon tests. The second stage of this culture has been dated to c. 1550 B.C.—1000 B.C.

Evidence regarding burial practices comes from Brahmagiri, Piklihal, Utnur, Tekkalakota, T. Narasipur, Nagarjunakonda and Hallur. As has been said earlier, there are two phases of the Neolithic culture in South India. Thus the burials obtained from Nagarjunakonda, Piklihal, Utnur and T. Narasipur are ascribable to the pure Neolithic phase while those excavated at Brahmagiri, Tekkalakota and Hallur belong to the succeeding phase of this culture. The details of these burials are as follows :

1. Nagarjunakonda

The earliest evidence of disposal of the dead comes from the Neolithic levels, described as the 'Polished Stone Axe Culture' at this site (a term given by Wheeler after the excavation of Brahmagiri in 1947). So far, six neolithic graves comprising of extended inhumations, and a damaged urn-burial of a child, have been excavated. All the six of them [1] were located in the southern part of the valley. The skeletons were oriented in north-south direction in fully extended position but the articulation was not complete. The funerary objects included earthenware pots of wheel as well as handmade burnished grey ware—a characteristic ceramic industry of South Indian Neolithic Culture. This ceramic has also been found in the habitation area at this site. It is not clear whether these graves are within the habitation area or outside. It is an interesting feature that most of the funerary vessels are spouted pots, although straight-sided bowl with featureless rim was also met with. The earlier shape has also been encountered from the neolithic graves at Piklihal and Brahmagiri. No other funerary object accompanied the skeletons.

The damaged urn-burial of a child [2], noted above, was found in the area to the south west of Nallarallabodu, to the west of the road to the museum. The detail of this urn-burial are not available. Besides, some 'pits' were also opened. They yielded pottery, animal bones (including remains of a deer in association with two intact pots), microliths and flake-tools. In one of these pits were found the remains of an articulated skeleton as in the "Sagging Burials". This is a unique feature of Nagarjunakonda neolithic burials.

2. Piklihal

Piklihal is one of the few sites of south India

which have yielded evidence of extended burials in a pure neolithic context. In all, three skeletons have been found from the present site, one each of a male, female and a child, the last being the earliest. Out of these three skeletons, two were found in layers 6 and 11 in Site VII which is a long narrow cutting, measuring 102×4 ft.

The burial of an adult female in layer 6 of cutting VII noted above, is clearly in the habitation area and near a hearth. The body had been buried in extended position in a shallow coffin-shaped pit, which was subsequently covered with a group of small stones, possibly to mark the place. The body lay on its back, the head being roughly towards the north. The head was slightly inclined to the right. The lower part of the skeleton was disturbed. The skull was mezocephalic and slightly prognathous. Funerary articles included a spouted earthenware jar to the left of the head and a tall vase, both of hand-made burnished grey ware. The contents of these pots are not known. No stone tool or ornament accompanied the skeleton [3]. In the same trench, skeleton of a child was found. In this case, the orientation of the skeleton is not toward the north, as was in the case of the former, but roughly towards the south-east. Again, the skeleton did not lie on its back but was resting on its right side. No grave-goods were encountered in this case [4].

The third skeleton [5], which was of an adult male, was excavated in layer 4 of a small cutting named VIII A. In this case, although the body lay on its back, the orientation of the body was entirely different and the head was towards the south. The burial-pit was a shallow grave, the exact outline of which could not be determined. The skull was mesocephalic and slightly prognathous [6]. After filling up the grave, large boulders were kept on the top, possibly to mark the spot. This feature was also present in case of the female skeleton described above.

This grave was interesting for its funerary objects. The grave-goods included five large well made chert blades on the right hand side of the skull, parallel to each other, and two basalt axes at the feet. A small bowl of unburnished hand-made grey ware was placed near the pelvis. Above the body the scapula of a bovine was discovered in the grave.

3. Utnur

This site has given only one burial. Thus, while digging on site I, Allchin encountered a shallow grave containing the much-damaged bones of a newly born infant [7] in layer 9. The bones were badly decayed and few could be preserved unbroken [8]. The burial came from before the stockade of Period I C.

4. T. Narasipur

The site yielded only one example of neolithic burial [9] found in a pit cut into layer 6. The skeleton was buried in extended position and was oriented east-west, the head being towards the east. The hands were placed over each other on the abdomen part. Funerary offerings included earthenware pots arranged near the head. They comprised of two pots of cream-coloured ware together with a shallow bowl with channel-spout. An interesting object was a pottery-stand with a concave top described as neck-rest. This object was found placed by the right side of the head. The pottery 'neck-rests' have also been found from the Neolithic levels at Tekkalakota and Jhukar levels at Chanhudaro in north-west India [10].

5. Brahmagiri

Evidence for the disposal of the dead comes from the upper sub-phase (i.e. I B) at this site. Here, two kinds of burials [11] were encountered. The adults and grown up children were buried in extended position in reglular grave-pits in the main habitation area. This practice conforms well with the method of burials of Neolithic people in the area. Two burials of this kind were excavated, both coming from the site Br. 17, of which only one could be completely exposed. This grave contained the body of a child, 8-10

years of age. In this case, the dead body was oriented in the east-west direction, the head being towards the east. The skull was observed to have been partially crushed. The body was in fully extended condition and was resting on its back. The left hand was placed near the pelvic-region. Funerary offerings included three earthenware vessels. Of these, two bowls were placed by the side of two femurs and a vessel with a funnel-spout was kept near the head. Wheeler has postulated that this vessel with its small cylindrical funnel may have been used to pour libation into the mouth or ears of the dead [12]. A similar vessel has also been found from a neolithic grave at Piklihal.

Another kind of burial was meant for children and infants who were buried in roughly made urns [13] of uniform type. The dead body was folded up into close compass and inserted into the pot. In all, seventeen urn-burials of children were excavated from various trenches. An eighteenth one comes from a pit coeval with the lowestmost deposit of the succeeding Megalithic culture. All the urn-burials are ascribable to I. B. sub-phase. Of these, four come from the cuttings Br. 16 A and 16 B, and eight from cutting Br. 17, belonging to four floor-levels. Of the remaining ones, five burial urns were found in Br. 21 and one was recorded from Br. 21 A. The burial urns are of dull mottled grey colour, often coarse and grey in fabric and are hand-made. They have a globular body, flaring mouth and rounded base. Their average height is thirteen inches and have a diameter of twelve inches at the mouth. These urns were buried in small pits, just sufficient enough to accommodate them. The urns contained the tightly folded bodies of infants and small children. The bones were in advance stage of decay; so it could not be ascertained whether the bodies had been buried intact or after a deliberate fragmentation [14]. However, skull, ribs and a few long bones were identified in almost all the cases. Funerary offerings were conspicuous by their absence. In one case, a small pin or rod of bronze and two small earthenware pots were found in an urn [15]. The urns were covered either with bowls placed upright or inverted or with the lower half of a broken urn.

6. Tekkalakota

Evidence of the disposal of the dead came from both the periods [16]. The burials of Period I comprised of two graves embedded in the red *morum*. These have been supposed to be of the 'fractional' type. However, the detailed description given by the excavators could entitle one to argue for 'incomplete' burials as well. This point has been treated in detail towards the end of the paper. The skulls and long bones were buried in south-north orientation, the head usually being towards the south. In one fractional burial of this period, remains of three individuals were found buried indicating possibly a 'community burial'. In the other case, remains of only one individual were found. The details of these burials are not available, but from the scanty evidence it is clear that it comprised of skull. Some pottery fragments indicating the vestiges of funerary offerings were found placed to the left of the skull. These included a fine goblet of ashy-grey colour.

In contradistinction to the practice of 'fractional burials' in the preceding period, the usual mode of the disposal of the dead in Period II was extended inhumation in the case of adult and urn-burial in the case of children. In the large-scale excavation on this site, as many as twelve extended inhumations of adults were excavated. Of these, eleven were found in a row on the northern side of the locality TKT-1. One extended burial came from TKT-2.

These adult burials were oriented north-south, the head being towards the north. In one case the skeleton was laid in four pots joined together. This is a unique feature of this site and indicates some contacts with the chalcolithic cultures of the Deccan where it was a general practice. The funerary offerings included earthenware pots, the number of which ranges upto

seven in one case. These pots include bowls of black-and-red ware painted in white and recall the bowls of the same ceramic industry from a burial at Tekwada [7]. In the case of child-burial, the body was placed in single or double urns joined together. Occasionally, children were buried under the floor of the house. Similar practice was in vogue in the chalcolithic cultures of the Deccan. The children were placed in the embryonic posture in globular urns [18].

7. Hallur

Recently, a small-scale excavation was conducted by M.S. Nagaraja Rao at Hallur [19], situated on the left bank of the river Tungabhadra in Taluk Hirekerur, District Dharwar. A 6.40 m. thick deposit at this site yielded relics of three different cultures, i.e., Pure-Neolithic, Neolithic-Chalcolithic and Megalithic [20].

Two infants' graves have been excavated from phase II (Upper Neolithic) at this site. Of these, a double-pot burial containing the remains of a child was found under the floor of a circular house. The remains of an infant were put in two urns placed mouth-to-mouth. The funerary offerings included three earthen-ware bowls. As is clear from the cultural outfit of this period, it is an intrusion from the contemporary chalcolithic cultures of Godavari-Pravara system where pot-burials are a common feature.

As has already been pointed out earlier, the burials of the neolithic culture of South India fall under two main divisions—those belonging to the Pure Neolithic Period and others ascribable to the succeeding Neolithic-Chalcolithic period. Evidence regarding the burials of the first category is very meagre [21] and any generalization based on this limited data is bound to have its own limitations. However, extended inhumation in regular pits dug in the habitation-area seems to be the general practice during this period. No standard seems to have been followed regarding the orientation of the corpse. Unlike the practice prevalent in the succeeding phase, both adults and childern were buried in regular pits. The funerary offerings include earthenware pots in all cases and a pottery head-rest in the case of the only burial excavated at T. Narasipur.

A marked departure from this practice is seen in the burials of the neolithic-chalcolithic period in this region. Thus, while the adults were buried in extended position, the infants were buried in roughly made urns placed in small pits just sufficient enough to accommodate them. The urns contained the tightly folded bodies of childern placed in embryonic position and were covered with lids. The urn-burials from Tekkalakota and Hallur were found from the house-floors. Funerary offerings were absent in these urns.

Evidence for the complete inhumation of the adults in this sub-phase has been obtained from Brahmagiri and Tekkalakota. The orientation of the corpse at Brahmagiri was in east-west direction, the head being towards the east, but the dead at Tekkalakota were oriented in north-south direction. Funerary offerings were placed in pottery vessels at both the sites. Of special interest is the reported occurrence of 'fractional' burials from the lowestmost levels of Tekkalakota. Implied in this discovery is the suggestion that the same neolithic folks laterly switched over to a new mode of disposal—extended inhumations—without any corresponding change in the cultural material. While it may not be altogether impossible, it has been noted that the change, if it has been, then it has always been the other way round. Furthermore, Tekkalakota is the solitary site in this region which has furnished the evidence of 'fractional' burials of adults. The possibility that these were originally extended inhumations has to be thoroughly ruled out before declaring these to be the case of 'fractional' burials. This point will assume added significance if further field-work in this region fails to produce any other instance of 'fractional' burial in a similar context. The alternative possibility pointed above is also inherent in the description of these burials given by the excavators. In fact, a distinction must be made between 'fractional' and 'fragmentary' burials.

A critical study of the various modes of disposal of the dead, as recorded from the neolithic-chalcolithic sites of South India, establishes beyond doubt that these cultures have borrowed certain traits from the contemporary cultures of the Deccan. That the two cultures were in contact with each other has been proved by the studies of Sankalia [22]. The burial of adults in more than one pot joined together and the urn-burials containing the relics of infants under house-floors were established customs in the chalcolithic cultures of Deccan. A burial of the former class has been found at Tekkalakota and several examples of the latter class have been ditscovered both at Tekkalakota and Hallur.

NOTES

[1] *Indian Archaeology*, 1957-58, *A Review*, 5.

[2] *Indian Archaeology* 1956-57, *A Review*, 36.

[3] F. R. Allchin, *Piklihal Excavations*, Andhra Pradesh Government Archaeological Series No., 1 (Hyderabad) 1960, 22.

[4] Ibid, 23.

[5] Ibid, 24.

[6] Ibid, 113.

[7] F. R. Allchin, *Utnur Excavations*, (Hyderabad) 1961, pl. 5b.

[8] F. R. Allchin, *Neolithic Cattle-keepers of South India* (Cambridge) 1963, 45.

[9] *Indian Archaeology* 1961-62, *A Review*, 35-36.

[10] Stuart Piggott, *Prehistoric India* (Harmondsworth) 1952, 224-224. Fig. 27.

The pottery head-rests from this site and other places have recently been studied by Allchin. Cf. F. R. Allchin, 'Pottery head-rest from Narasipur Sangam' in *Studies in Prehistory* (ed.) D. Sen and A. K. Ghosh (Calcutta) 1966, 58-63.

[11] R. E. M. Wheeler 'Brahmagiri and Chandravalli 1947' *Ancient India*, No. 3, 202.

[12] Ibid, 203.

[13] Ibid, 202.

[14] Ibid, 226.

[15] It was found in Urn No. T. 36 in cutting Br. 21 and is assignable to the early part of sub-phase IB.

[16] *Indian Archaeology* 1963-64, *A Review*, 24-25.

[17] *Indian Archaeology* 1956-57, *A Review*, 18.

[18] M. S. Nagaraja Rao and K. C. Malhotra, *The Stone Age Hill Dwellers of Tekkalakota* (Poona : 1965), 27-33.

Also, M. S. Nagaraja Rao, 'New Evidence for Neolithic Life in India : Excavations in the Southern Deccan' *Archaeology*, XX, No. 1. (January : 1967), 34-35.

[19] *Indian Archaeology* 1964-65 A Review (cyclostyled copy), I-58.

Also M. S. Nagaraja Rao (1967), 30.

[20] *Indian Archaeology* 1964-65 A Review (cyclostyled copy), I-58.

[21] Only six and three burials have been exposed at Nagarjunakonda and Piklihal respectively while Utnur and T. Narasipur have given one example each.

[22] H. D. Sankalia and others, *From History to Prehistory at Nevasa* (Poona : 1960), 498-503.

A New Painted Pottery From Vidarbha

by S. B. DEO

The older view advocating that there was no copper age in the Deccan has now been finally discarded. The excavations at Nasik-Jorwe in 1952 by the Deccan College, Poona, gave considerable evidence of fairly large chalcolithic habitations. Explorations and excavations in subsequent years have revealed a very extensive colonisation by the chalcolithic people in Maharashtra with possible cultural contacts with the north and the south.

The picture which has emerged during the last fifteen years gives a clear indication that the valleys of the Krishna, Godavari, Pravara, Ghod, Girna, Tapi, Bhima, and Nira were habitated by chalcolithic period between about 1300 and 1000 B.C.

The characteristic trait of the chalcolithic cultures of the Maharashtra region is the extensive use of the now familiar Jorwe ware which has been named after the type site in Ahmadnagar district. This pottery is distinguished by a metallic ring, mostly matt surfaces, regular striations on the interior, mostly geometric painted designs and two fossil types such as the spouted pot with funnel-shaped mouth and carination at the shoulder and the carinated bowl.

The chalcolithic ceramic industry of the Maharashtra region is essentially the Jorwe. At Nevasa, Nasik and Jorwe, it was the dominant unadulterated trait of chalcolithic horizons, the top levels of which could be dated at Nevasa at least to c. 1100 B.C. on the basis of C-14 dating.

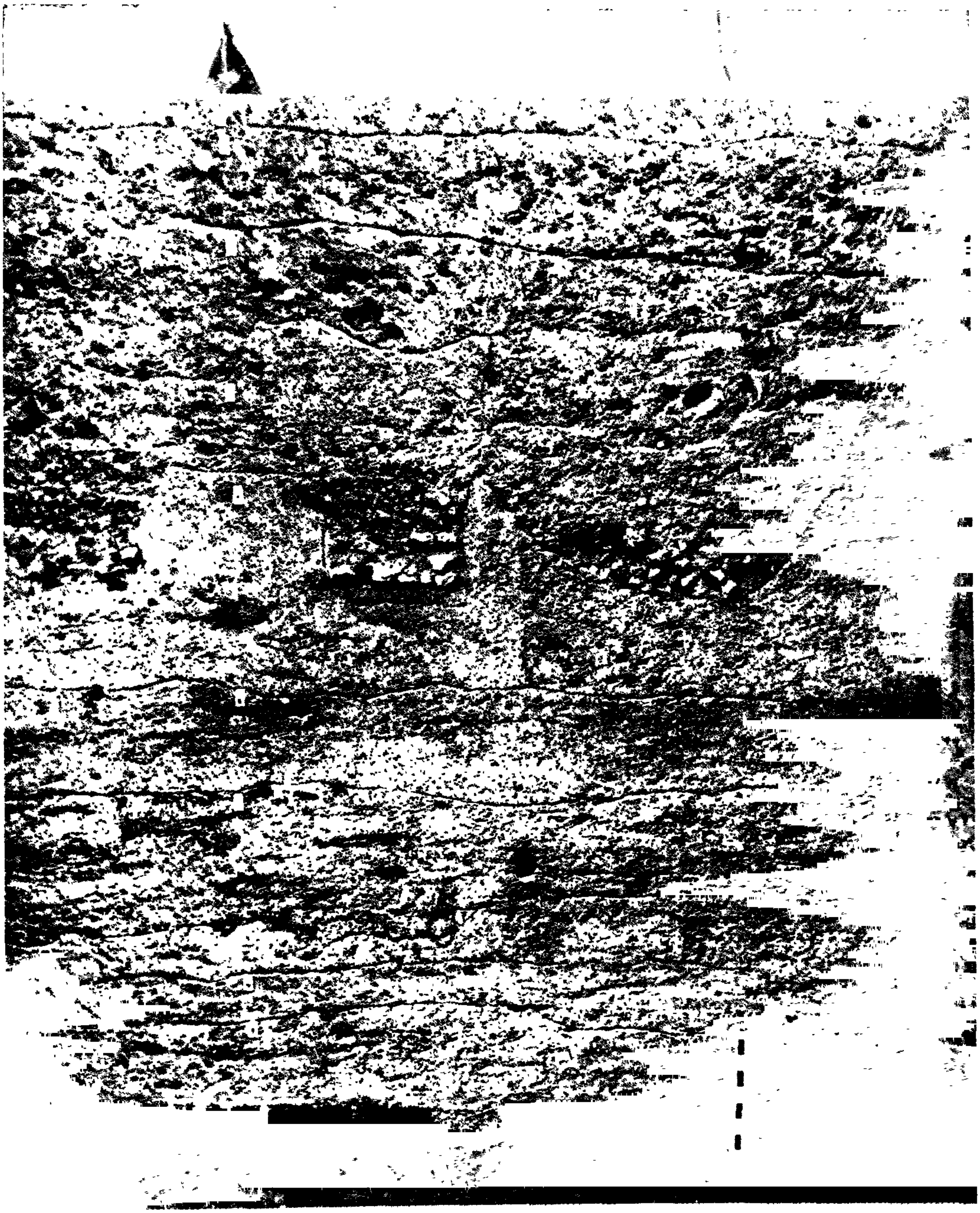
However, this dominance of the Jorwe pottery at the key sites in Maharashtra, with tempting possibilities of assigning its origins to this region, was vitiated by the occurrence of the Jorwe ware in relatively earlier horizons at Navdatoli in Central India and in post-Malwa pottery horizons at Daimabad in Maharashtra itself. The position now is that the Malwa pottery, at least at Daimabad, has a precedence over the Jorwe, and the Jorwe appears to be earlier in period in Madhya Pradesh than that assigned to it in Maharashtra proper.

The picture was further complicated by the association of the Black-and-Red pottery with the Jorwe and the Malwa wares at Chandoli, Songaon, Bahal and Daimabad. The Black-and-Red ware is totally absent in chalcolithic horizons at Nevasa, Jorwe and Nasik. It, however, penetrates further south in a Neolithic-Chalcolithic context.

The Vidarbha region of Maharashtra has not been so far extensively tapped archaeologically. The excavations at Kaundanpur and Junapani are the only two noteworthy contributions so far.

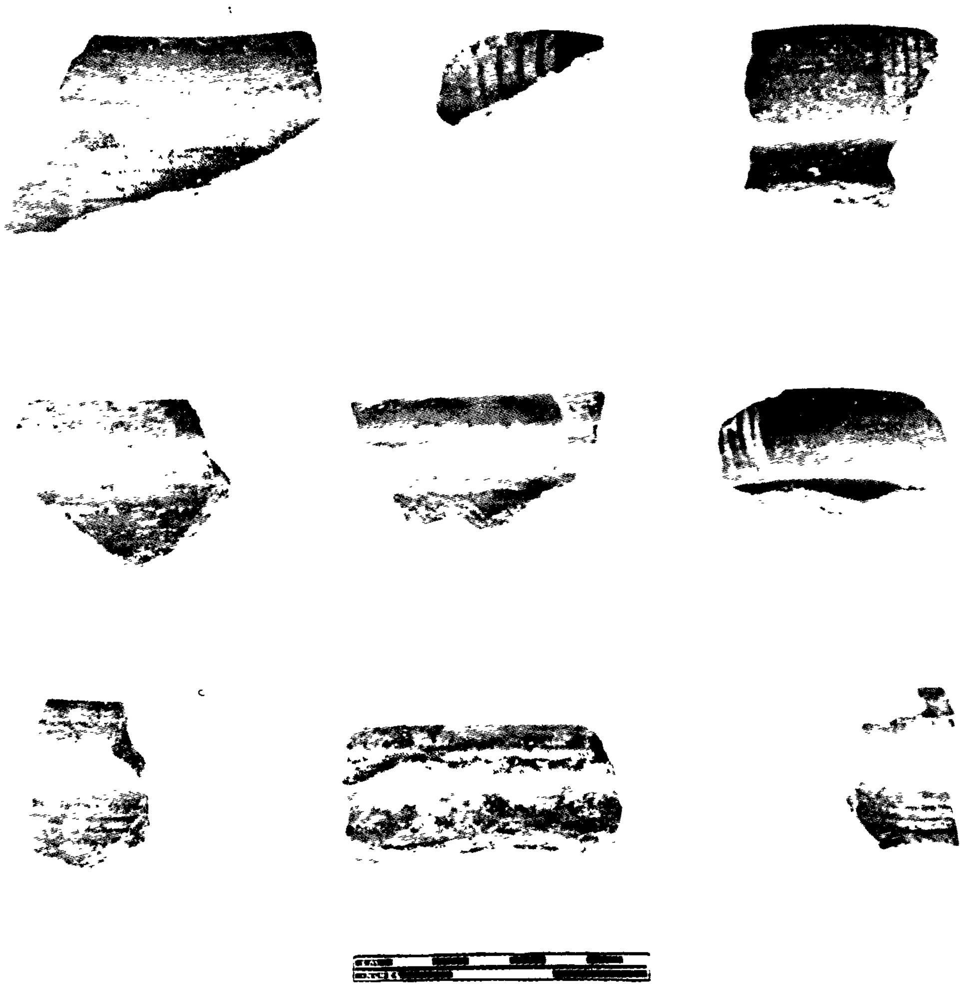
Of the two, Kaundanpur [1] in District Amraoti was excavated on a small scale. Here the first period of occupation was characterised by " a megalithic culture (?) " which gave black-and-red wares which were gritt-tempered and having mostly vases with flaring rims. This ware was associated with etched beads with megalithic decorative pattern which possibly tempted the excavator to designate the period as megalithic. Here, no painted pottery was encountered.

At Junapani [2] in Nagpur Taluk, scientific digging was done by the Archaeological Survey, though the site was tapped as early as 1867. In the excavations done in 1960-61, the excavator found four ceramic fabrics : black-and-red, all black, plain red and a ware tempered with micaceous grit. The excavator also pointedly refers to the find of " a bowl of red ware with a hole-



Section of the main trench at Paunar (Layer 9 yielded the painted pottery).

PLATE IV



Painted Pottery, Paunar, Period I.

mouth spout and painted in black pigment with oblique strokes on rim", associated with the black-and-red pottery picked up in the cairn.

Maharzhari]3], opposite Junapani, contains nearly 300 megaliths of the cairn type. On surface explorations, the site is reported to have given numerous beads, though no ceramic evidence is referred to.

The evidence of the painted ware associated with the black-and-red ware at Paunar [4] in the earliest occupation [5] assumes significance when seen in the light of the black-and-red ware association with the chalcolithic painted pottery at Chandoli, and at a number of sites in Khandesh [6]. At Prakash, the Black-and-Red has been found in horizons earlier than those of the NBP [7], which proves that the Black-and-Red can be dated at least prior to the 5th Cent. B.C. [8].

Nearer Paunar, there have been reports of the find of a "chalcolithic site near Marda" in Distt. Chanda which has yielded black-painted red ware sherds [9]. Reference has also been made to the chalcolithic site at Tuljapur Garhi in Distt. Amaraoti [10].

The painted pottery in the earliest occupation at Paunar has been found in horizons which are devoid of iron. Moreover, the shapes of the associated Black-and-Red are not megalithic. And thirdly, one of the sherds of the Black-and-Red bears traces of paintings in dull white. Thus, the context shows that Paunar painted pottery is essentially non-megalithic and could be chalcolithic. Moreover, the concentration of stone circle, so far reported, falls to the east and south-east of Paunar, so far as Vidarbha region is concerned. Thus the painted ware of Paunar adds a new element to the chalcolithic assemblage of Maharashtra.

The fabric of the painted ware from Paunar is essentially mediocre. It is not metallic like the Jorwe, nor it is well-fired like it. It has a ill-fired smoky blackish core with the clay full of small pieces of hey and particles of lime. The slip applied over the entire external surface and only the rim part internally, is drab Indian red and has an uneven application as one feels it. Over the slip, painting in dull black comes. It covers the rim externally and internally, the neck and the shoulder portion. Whereas the rim has only groups of vertical strokes and the neck a series of bands, the shoulder has either close parallel bands drawn horizontally or drawn haltingly and latticed diamonds and triangles. Though almost entirely geometrical, the designs show quite a range in painting [11], as for instance, strokes, groups of slanting or vertical lines, groups of short slanting strokes, the star design (D5), short slanting dots (D18), slanting strokes (D8), groups of horizontal lines drawn haltingly in vertical piles (D16) and irregularly drawn meshes (D15, 17). Normally the bands are thick, but there are specimens which display finer execution as well (D12, D13). It may be worthwhile to note that D3, D5, D8, D9, D11 and D18 are also to be found associated with the Malwa ware in the second season's excavation [12].

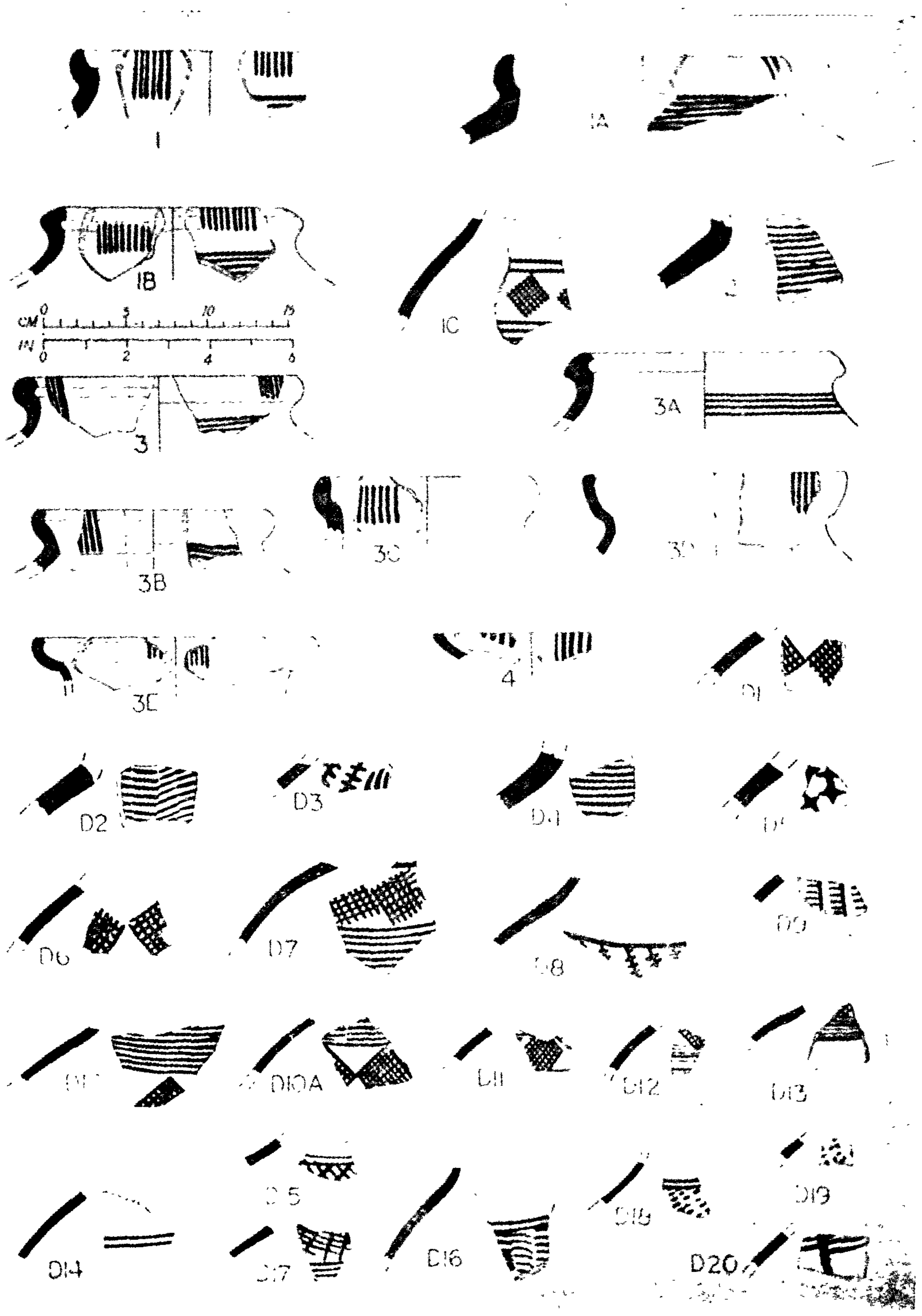
Typologically, there is not a single shape which falls in the Jorwe group. Especially the hooded rims are not to be met with in Jorwe at all. It may, however, be noted that the hundred and odd sherds recovered, only a few could be indicative of any shape. A look at Plate V would show that only two main shapes could be had, to wit, globular vessels with broad mouth with hooded or internally undercut rim [13] (T. 1 to 3C) and a dish-cum-cover (T-4). It may be stated here that anologues can be had for the last from Navdatoli [14].

The occurrence of painted pottery and the black-and-red in a non-megalithic and non-iron context indicates the colonisation of Vidarbha by a people whose antecedants could be chalcolithic. How they came and under what condition cannot be stated precisely. However, these people seem to eke out of their living by fishing as a large number of terracotta net-sinkers indicates. Their houses were of clay and they used circular hearths made of clay. Though no other evidence could be had, it appears that in the

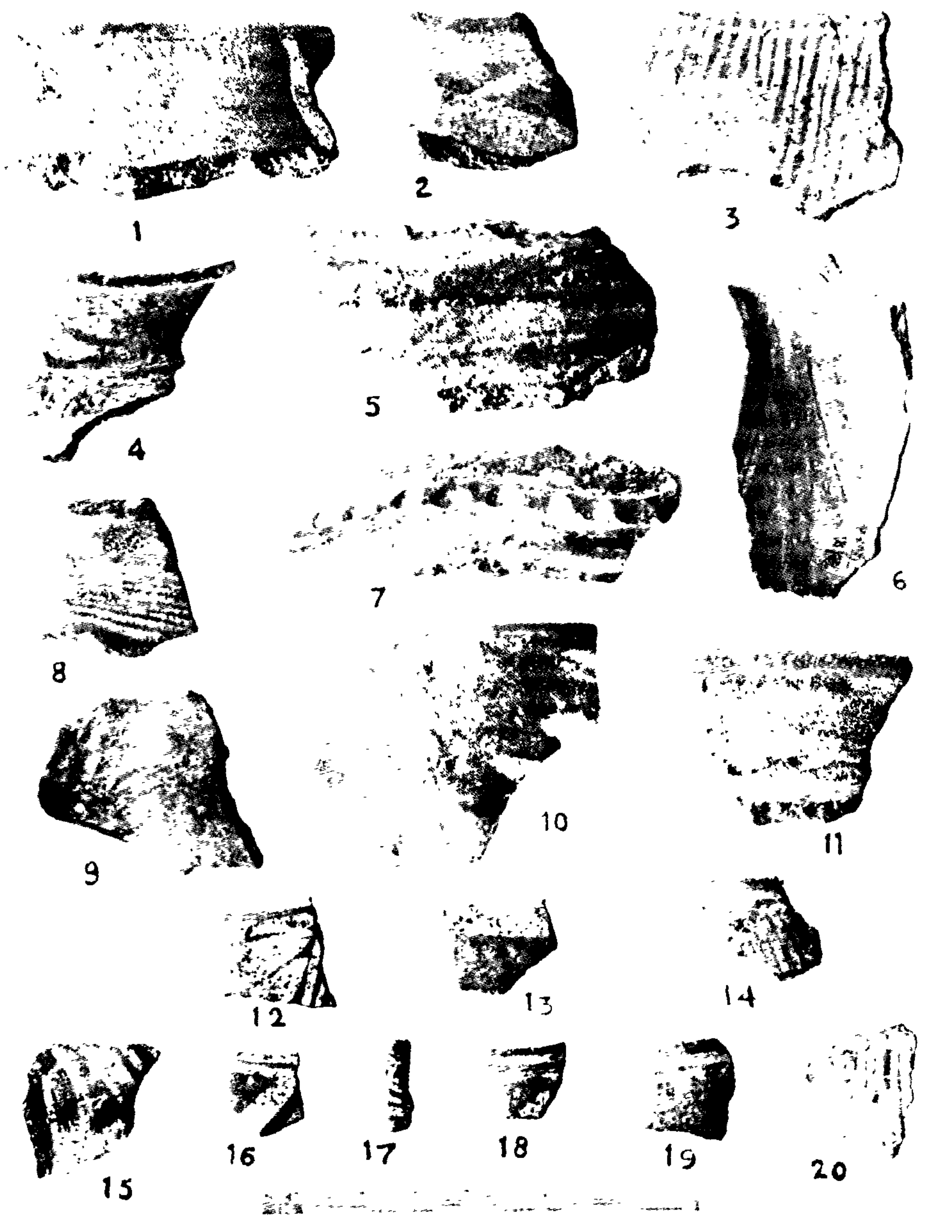
earlier half of the first millennium B.C. they settled on the bank of the river Dham practising fishing and possibly farming. The bone remains of this period indicate that they had fairly large herds of domesticated cow, bull and goats. Thus there were possibly the earliest farmers of Vidarbha with chalcolithic set up.

NOTES

[1] *Indian Auchaeology* 1961-62 *A Revlew*, 29-30.
[2] Ibid, 32-34.
[3] Ibid, 1958-59, 21-22.
[4] See Pl. II for mound at Paunar
[5] See Pl. III of main trench at Paunar.
[6] *I.A.R.* 1958-59, 22-24.
[7] Ibid, 1954-55, 13.
[8] Ibid.
[9] Ibid, 1963-64, 39.
[10] Ibid, 1965-66, 53.
[11] See Pl. V.
[12] H. D. Sankalia *et. al.*, *The Excavations at Maheshwar and Navdatoli* (1952-53) Fig. 18, T. 20 m; Fig. 46, designs Ic, f.; Fig. 53, designs c ard f.
[13] See Pl. IV and V.
[14] Sankalia *et. at.* I bid, T. 10, 10c (Fig. 8),; T. 26 (Fig. 25).



Painted pottery : shapes and designs.



Painted pottery from explorations : selected types. 1-3, 8-10 and 12-20 from Singanapalle; 4-5, and 11 from Ramapuram; 6-Sivavaram.

The Use of the Terms 'Prehistory' & 'Protohistory' in Indian Archaeology*

by K. K. SINHA

There has been a great spurt in archaeological activities during the last twenty years. The result has been a sizable increase in our knowledge of India's hitherto unknown past. It is only natural that more and more of Indian universities are planning to include archaeology in the teaching courses. In this context, there is a need to standardize the scope of the terms 'Prehistory' and 'Protohistory' in Indian archaeology. In this paper it is proposed to examine the alternatives and to suggest modification in the present usage of these terms. But by way of a brief introduction, the current use of the terms in the all-world context may be alluded to.

According to French scholars with whom the word '*la Protohistoire*' is fairly common, prehistory deals with the phase before the history. The latter is said to begin with the advent of writing. In certain restricted areas of the Asia like Egypt, Africa and Mesopotamia, history begins from c. 3000 B.C. According to the french scholars, '*la Prehistoire*' ends *everywhere* in the world with the birth of history in parts of western Asia. All other societies which had no writing or historical records of their own should be grouped under what has been termed as 'Protohistory.' French scholars were apparently obsessed by the fact that there were societies with no writings of their own and which were in close relationship with the historical cultures of western Asia. As these societies could neither be studied under 'prehistoric' nor under 'historic', the French found it expedient to use the word 'protohistory.' If the scope of 'Protohistory' would have been restricted to such societies only as were known to have existed at the fringes of historical people and having close relationship with them, there could not have been much dispute. The complications arise because according to the French usage, 'Protohistory' has a general and wide application and will include all societies existing anywhere in the world after, say, 2500 B.C. The British scholars, on the other hand, are never happy with the word 'protohistory' and in fact, do not use the word at all. According to them, 'Prehistory' should extend right upto the point where the local historical records emerge. They go on to further elaborate the point that the use of the word must not disguise the fact that there are degrees of 'prehistory'. Since once the historical communities were in existence, all non-literate, non-historic and pre-historic communities were necessarily contemporary in time. Some of the British archaeologists, notably Graham Clarke and Christopher Hawkes, have sometimes used the words 'primary' or 'absolute' to distinguish from what has been described as secondary Prehistory. For most of Europe, Prehistory extends right upto the beginning of Roman conquest and accordingly Bronze Age and Iron Age besides Stone Age are very much part of European Prehistory, according to most English-speaking scholars.

At this moment we may consider the position in India. Here the matters are somewhat complicated by the fact that the 'Indus' civilization was a fully literate one and yet non-historic, since its records are not intelligible to us. British archaeologists have no doubt in their mind that the 'Indus' or Harappan civilization should form part of Indian

* The paper was read at the 55 th. Session of Indian Science Congress held in January 1968 at Varanasi.

Prehistory. H. D. Sankalia, on the other hand, thinks that it would not be proper to relegate the Indus civilization which was fully literate to the status of a pre-historic community. According to him, 'it is not their (i.e. Harappan) fault that we cannot decipher their records.' Subba Rao [1] was first to use the tem 'Protohistory,' but its usage gained wide currency in the writings of Sankalia [2]. The present position is that while prehistory is meant to include only Stone Age prehistory, 'Protohistory' is taken to cover a sprawling period from c. 3000 B.C. to 600 B.C. and history begins in India roughly from about 600 B.C.

The present grouping mainly after Sankalia, raises certain basic questions. So far as Palaeolithic archaeology in India is concerned, very little is known and its study and research are unquestionably linked up with palaeontological and environmental studies. In most of the European countries, the emphasis has quite naturally shifted to this aspect of the question. The Indian Middle Stone Age has yet to acquire a definitive status. My point is that if prehistoric Archaeology in India is to restrict itself to Stone Age, there is not much to go by way of a teaching course, let alone for specialized study. Nevertheless, there is quite a lot of spade-work to be done by way of planned and independent field research in close collaboration with palaeontologists and palaeobotanists, but that is another matter. This brings to the question of Neolithic cultures of India. Sometimes they are dubbed under prehistoric and on other occasions under 'Protohistoric.' The confusion is because there were sizable pockets of Neolithic cultures which existed even after the end of the Indus civilization. This anomaly may perhaps be sharpest in the case of neolithic settlement recently discovered at Burzahom in Kashmir. It has a date range of c. 2000 B.C. to 1700 B.C. according to radio-carbon tests. The 'Harappan' had not only come into existence but were not far removed in space as well. The 'pure' Neolithic was succeeded by 'pottery using' people also Neolithic in character. One is also in difficulty to assign particularly many Neolithic, Neolithic-cum-Chalcolithic cultures of central, western and southern India that flourished after the Indus civilization. In a normal situation, these communities with no writing should be studied under prehistory but the present position is vague and no uniform pattern has been devised. There is thus need to rationalize the groupings. We may at this stage examine the validity of Sankalia's objection to Indus civilization being listed under 'Prehistory' which has been briefly referred to above. As pointed, Sankalia feels that we shall not be doing justice to the 'Harappan' if we give them the label of 'Prehistoric community'. Nobody denies the fact that the 'Indus civilization' was fully literate, but the script being undeciphered, the records are no aid to the reconstruction of the past. Prehistory. Protohistory, etc. denotes essentially our conception of past. Implicit in this suggestion is that our understanding of the past will be subject to limitations such as unintelligibility of records. All this need not be mixed up with the achievements or otherwise of the Indus civilization or more precisely whether it was literate or not. Accordingly if we decide to call 'Indus' civilization prehistoric, it is suggestive of the fact that we are expressing primarily our sense of helplessness that the written records have no meaning in deriving our knowledge about that civilization. I am more than inclined to agree with Piggott's view [3] that 'a literate civilization where script cannot be read has to be treated as 'Prehistoric'... I would regard as the essential unifying factor in all prehistory is that our knowledge is based entirely on archaeological evidence as distinct from literary evidence.' Accordingly, 'Indus civilization' about which archaeology alone provides the entire basis of our knowledge should appropriately come under Prehistory. This amended grouping will have the added advantage that there will be no

confusion with regard to grouping of post-Harappan cultures of central and western India under 'Prehistoric'. Now we may consider the question: What should be the range of 'Prehistory' in Indian context—whether or not it should extend upto 600 B.C. at which point the history of India is said to begin. The period from 1300 B.C. to 600 B.C. [4] roughly syncronizing with what has been loosely termed as Vedic Age which is neither prehistoric nor fully historic may be given the label of 'Protohistoric.' In this connection, it may be noted that Vedic literature, which is not a historical writing had come into being. To sum up, the suggested divisions will be as follows :

A. Prehistoric Period—pre-1300 B.C., to include Stone Age Prehistory, pre-Harappan cultures, Indus Civilization, Chalcolithic and Neolithic Cultures.

B. Protohistoric Period—1300 B.C. to 600 B.C.

C. Historical Period—600 B.C. and onwards.

NOTES

[1] B. Subba Rao, *The Personality of India*, (Baroda), 1958. p. 38.

[2] H.D. Sankalia, *Prehistory & Protohistory of India and Pakistan*. (Bombay), 1963.

[3] S. Piggott, 'Theory in Prehistory', *Evolution after Darwin*, ed. Sol Tax.

[4] The date 1300 B C. though arbitrarily taken, has one point to commend. The *Bagazkoy* inscription dated to roughly thereabouts mentions the Vedic gods.

A Note on the Chemical Composition of Some Glass Beads from Rajghat, Varanasi

by H. C. BHARDWAJ

The excavations from Rajghat have yielded about 400 glass beads. The colour variations include from light yellow to different shades of green and blue. There are also beads of buff, red, brown and dark tints amounting to black. There are quite a few beads of black-and-white and black-and-red colour. Most of the beads are translucent, but there are many which are transparent and quite a few are opaque. Among the shades of blue and green, there are pale blue, azure blue, bluish green and pale green beads which approximate the shades of aquamarine, lapis lazuli, turquoise and orient emerald. Blue shades also include variations from light blue to dark blue. Amongst the shade of red, most of the beads are opaque. Majority of these resemble the shade of sealing wax, a few that of coral and jasper. There are also some which are orange in colour.

For the present study, beads have been selected from period I of Rajghat.

Amongst the 400 glass beads, about two dozen come from period I, six of these are black, five are of different shades of blue (mostly light blue), five of green and three are of opaque red glass. For the purpose of detail study (including chemical composition) five beads from this period have been selected.

Description of the Beads

1. Black bead. translucent; in thin section the colour is dirty green ; has a typical conchoidal fracture. It has Sp. gr. 2.41. Under microscope shows air bubbles and a few inclusions. There is no devitrification.
2. Bluish green (approximating the shade of turquoise). translucent; has a typical conchoidal fracture. Sp. gr. 2.397. Under microscope small round and elleptical air bubbles are seen. There are no inclusions. No devitrification.
3. Olive green. It is almost transparent; has a conchoidal fracture. Sp.gr. 2.36; a few air bubbles present. No devitrification.
4. Pale blue. It is translucent. Does not have the typical conchoidal fracture.

TABLE I

General Description of the Glass Beads

Sp. no.	Reg. no.	Period	Date	Colour	Vision	Sp.gr.
1.	825	IB, IC	600 B.C.—200 B.C.	Black	Translucent	2.31
2.	282	IB, IC	—do—	Bluish green	—do—	2.39
3.	2345	IB	600 ,, —400 B.C.	Olive green	Transparent	2.36
4.	876	IB	600 ,, —400 ,,	Pale blue	Translucent	2.37
5.	915	IB	—do—	Reddish-brown	Opaque	2.44

The surface is riddled with cracks. Sp. gr. 2.37.

5. Opaque reddish brown. resembles sealing wax in colour and appearance. It has conchoidal fracture; has sp. gr. 2.49.

The glass beads are in good state of preservation except the sp. no. 4 (pale blue bead), the surface of which is riddled with minute cracks, and none of these is decomposed. The hardness of these beads approaches that of orthoclase (hardness on Moh's scale-6). While some scratch the orthoclase, others are scratched by it. Most of these are translucent. Though their lack of transparency might have been preferred so as to imitate precious stones, yet it might be observed, it is due to defective fabrication that they lack transparency. This might have resulted because the melt was not heated enough, so as to be completely molten. The examination under microscope reveals inclusions and air bubbles of the following description.

Inclusions or Stones. These are probably of non vitreous nature, (non discernible to the naked eye, mostly opaque). This could be due to pieces of material which have broken away from the melting pot or might be batch stones which have escaped melting. These inclusions are responsible for the lack of transparency.

Air bubbles or Vacuoles. Under microscope the translucent glass shows that the general matrix is transparent but in it are embedded vacuoles of different shapes and sizes. This can be explained by the fact that during the first stage of melting (founding period) gases are given off in large volumes and bubbles are formed, which might have been embedded in the vitreous matrix. To remove these bubbles in the glass, plaining or fining is necessary and requires higher temperature, which might not have been attained. The bubbles might also be responsible for general lack of transparency.

Chemical Composition of the Glass Beads

Out of the five samples analysed, three specimens nos. 1, 3 and 4 are Soda-Lime Silica glasses (Table II). Specimen no. 2 is Potash-cum-Soda-Lime-Silica glass. The alkalies could not be determined in specimen no. 5 on account of paucity of the sample.

The silica content is in the range of 64.68 to 70.09%. The variation in their silica content and its comparative high percentage could be due to certain amount of weathering during burial [1]. From the content of alkalies it might be said that soda was more popular alkali used

TABLE II

Table Showing the Chemical Composition of Glass Beads from Rajghat.

SPECIMEN	1	2	3	4	5
	%	%	%	%	%
SiO_2	64.68	70.09	67.07	68.05	65.01
Fe_2O_3	4.20	1.26	2.58	1.84	9.67
Al_2O_3	7.89	3.34	9.95	2.76	2.28
CuO	—	1.13	—	2.40	—
Cu_2O	—	—	—	—	5.27
NiO	—	—	—	—	0.15
CaO	5.42	8.90	6.35	8.04	4.08
MgO	0.86	1.10	0.44	0.98	0.49
Na_2O	17.54	5.25	13.81	16.03	13.05 (by difference)
K_2O	0.30	9.74	0.36	0.62	
TOTAL :	100.89	100.81	100.56	100.72	100.00

by the craftsmen but potash was used at least in conjunction with soda.[2]. Since all the glasses contain iron oxide (1.26% to 9.67%) it is quite likely that it might be present on account of impurities in the batch materials, e.g. sand and alkalies etc. However, when the content of iron oxide is about 2% or higher iron oxide could have been added separately to the melt. High content of alumina 7.81 and 9.95 in specimen nos. 1 and 3 respectively suggests the use of felspathic material, while in other samples, alumina is present as an impurity and might have been derived from the melting pot [3]. Lime is present in moderately good amount and might have been obtained by use of lime stone. The presence of magnesia is probably on account of impurity. This may rule out the possibility of the use of either calcite or dolomite. The absence of lead from these glasses is also of some significance [4]. Though these are multi-component glasses yet it is possible that sand and alkalies were the only batch materials and all the iron oxide, alumina, lime and magnesia were derived from the impurities present in the sand, the alkalies and the refractory materials (arising through corrosive action during melting) [5]. Copper compounds look to be the main colouring agent added to the melt.

Specimen no. 5 has a composition to be classed as haematinum [6] or copper aventurine [7]. Batch formula of this opaque red glass does not show any resemblance to other glasses of the class (Table III). Further the presence of nickel oxide suggests its indigenous manufacture.

In addition to these analyses the author is not aware of any other analysis of opaque red glass beads from India. In connection with opaque red glass bead from Nalanda, Lal [8] points out that no such material has been discovered elsewhere in India. It might be concluded that the percentage compositions of the various constituents of glass, as revealed by the analyses, are quite compatible for producing glass scientifically and this accounts for their good condition after centuries of burial.

Colouring Agents

Black. The glass, as stated earlier, is black due to the thickness of the bead. Further the presence of inclusions has also made it look dark. In thin section the glass is dirty green. The only colouring agent present in this case (sp. no. 1) is iron oxide (4.20%) (Table III) which probably occurs partly in the ferrous form and partly in the ferric condition. The greenish tint, as seen in the thin section, is due to ferrous iron [9]. Ferric iron is liable to impart only weak yellow colour.

Blue. The specimen nos. 2 and 4 contain 1.13 and 2.4 percent copper oxide (CuO) respectively and 1.26% and 1.84% ferric oxide respectively. Blue colour of these glasses is due to the cupric copper. The presence of ferric oxide (in the absence of manganese oxide or other decolouriser) might have added yellowish tint, which is not intense. Further the colour might have been also affected by the base of the glass and temperature.

TABLE III

Table Showing Chemical Content of Opaque Red Glass Beads from Other Sites.

S.No.	Description of the specimen.	SiO_2	Al_2O_3	Fe_2O_3	FeO	Cu	Cu_2O	CaO	MgO	Na_2O & K_2O
		%	%	%	%	%	%	%	%	%
1.	Opaque red glass bead from Nalanda.	61.05	9.82		7.01	—	0.49	4.20	0.6	15.90
2.	Coral glass bead from Assam	53.25	9.16	6.12	—	9.13	—	9.18	1.47	11.69

Green. The specimen no. 3 has a total content of 2.58% of iron oxide which is present partly in ferrous and partly in the ferric condition. It is the combined effect of ferrous (green colour) and ferric (yellow tint) iron that the bead is coloured olive green.

Opaque reddish brown. The reddish brown colour of the specimen no. 5 resembles the colour of sealing wax. The glass of this bead has a typical composition. Among the colouring agents 5.27% of cuprous oxide, 9.67% of iron oxide, and 0.15% of nickel oxide are present.

Under microscope, crystals of cuprous oxide on a transparent back ground are revealed. It is a type of haematinum (blood glass). Regarding its colour and opacity it may be pointed out, when copper is added (either as metal or in the form of a compound) to the melt in ordinary way, it always produces green or blue colour. However, when the oxidation of copper is prevented by the presence of a reducing body and the glass is cooled gradually an intense ruby colouration is produced. But when the content of copper (Cu_2O) is high, the glass assumes a browner colour and becomes opaque. The opacity is probably due to the fact that cuprous oxide has been driven out of silica combination on account of the weak chemical affinity between silica and cuprous oxide [10].

The presence of high percentage (9.67%) of iron oxide is noteworthy. Some of it might be in ferrous condition which might have contributed, in conjunction with cuprous oxide, to the shade of the glass. The presence of 0.15% of NiO looks to be on account of impurity. Though it is supposed to exert a powerful colouring influence in glass, usually greenish brown colour is produced. It has also been advocated as a decolouriser [11]. However, when more than one colourant is present, the interaction of various factors causes the actual absorption effect produced to be too complex to be predicted in simple terms [12]. So it is very difficult to attribute the effect of 9.67% iron oxide and 0.15% of NiO. The presence of nickel oxide, which often occurs as an impurity associated with Indian copper, may point out to the indigenous manufacture of this opaque red glass bead.

Lal [13] attributes the red colour of the Nalanda bead (Table III) to the presence of ferrous silicate and cuprous oxide. The brownish colour of this bead may be due to the high percentage of cuprous oxide. Neuberg states that as the proportion of cuprous oxide is increased, the red colour assumes a browner shade and finally becomes opaque.

TABLE IV

Table Showing the Colouring Agents & Melting Conditions

Specimen No.	Chief colouring constituent	Percentage of colouring constituent	Batch Material	Colour Produced	Melting condition.
1.	Ferrous oxide	4.20	Ferric oxide	Dirty green Becoming dark due to the thickness of bead.	Reducing
2.	Cupric oxide	1.13	Copper oxide	Bluish green	Oxidizing
3.	Ferrous oxide } Ferric oxide }	2.58	Ferric oxide	Olive green	Reducing
4.	Cupric oxide	2.40	Copper oxide	Pale blue	Oxidizing
5.	Cuprous oxide	5.27	Copper oxide	Reddish brown	Reducing

Archaeological Value

Amongst these specimens, sp. no. 5 needs special mention. Beads of red opaque glass—the shades of coral and jasper as also in various nuances of red, have been reported from many archaeological sites all over the world [14]. Neuburg [15] states that during the course of centuries, the process of making this type of glass was repeatedly forgotten only to be discovered fresh.

Though, so far the glass beads have not been assigned any particular dating value, yet they do have some potentiality, provided stratified glass beads were chemically analysed and the analyses appended to the excavation reports. Further the beads might have been exchanged by the people in antiquity, and their analyses could throw light on human movement and contact.

Five opaque glass beads of dark red colour have been reported from Ahichchhatra (distributed in Strata VIII-to II). At Kauśāmbī this glass is common in 2nd century A.D., though one specimen is dated about 200 B.C. This type of beads have also been reported from Kumarāhar, Mason Dih etc. In South also, such beads are known from Maski, Kondapur, Arikamedu etc. though in a later sequence [16].

According to Dikshit [17], among the earliest beads of this glass, one is from Ahichchhatra Stratum VIII, (300-200 B.C.) and another from Kauśāmbī (200 B.C.). Here it may be pointed out that sp. no. 5 comes from period IB of Rajghat which is dated (circa 600 B.C. to 400 B.C.), and so might be even earlier than those.

The author is thankful to Professor A. K. Narain, Principal, College of Indology, Banaras Hindu University for giving facilities and encouragement throughout the work.

NOTES

[1] Turner has shown that the weathering of glass results in changes in its composition, the increase for instance of its silica content. Further, even in the confines of a single site, there does not apply an absolutely constant weathering process. W. E. S. Turner, ' Studies in Ancient Glass and Glass Making Processes Pt. II : The Composition, weathering characteristics and historical significance of some Assyrian Glasses of the 8th to 6th century B. C. from Nimrud ', *J. Soc. Glass Technology*, XXXVIII, 1954, 453 T.

[2] Alkalies might have been obtained from the extract of crude natron (Reh), which is essentially a mixture of Na_2CO_3, $NaHCO_3$, Na_2SO_4 and NaCl, together with traces of calcium and magnesium salts. Reh abounds in this area, and it is stated that about 2,000 tons of *Sajji matti* (reh with high proportion of carbonates) used to be sent annually to Calcutta from Banaras, Azamgarh and Ghazipur (*Rec. Geol. Surv. India*, 1930, 64, 432).

[3] R. J. Forbes, *Studies in Ancient Technology*, V, 116.

[4] Lead has been reported from Taxila glasses. *An. Rep. Arch. Surv. Ind.* 1922-23 (1925), 158.

[5] W. E. S. Turner, 'Studies in Ancient Glass and Glass Making Processes', *J. Soc. Glass Technology*, XL, 1956, 297 T.

[6] Haematinum or blood glass is opaque and if greatly magnified, reveals crystals of cuprous oxide on a colourless base. F. Neuburg, *Glass in Antiquity*, (English-translation),1949, 3.

[7] Aventurine glasses are those which have become supersaturated with colouring oxides and on cooling under suitable conditions the colouring oxide crystalizes out and remains scattered as suspended particles in the glass. Copper aventurine is produced when in 100 parts of sand, six to eight parts of copper oxide are incorporated. (R. Charan. *Handbook of Glass Technology*, 1956, 55).

[8] B. B. Lal, 'Examination of some Ancient Indian Glass Specimens, *A. I.*, 8, 1952, 24.

[9] G. W. Morey, *Properties of Glass*, 1954, 457-458.

[10] R. Charan, op. cit., [7] P. 49.

[11] W. Rosenhain, *Glass Manufacture*, 191.

[12] *Op. cit.* [9], 458.

[13] *Op. cit.* [8], 24.

[14] This type of glass beads have been reported from early period of Egypt and Roman Imperial epoch. *Op. cit* [6], 3.

[15] Ibid.

[16] M. G. Dikshit, ' Beads from Ahichchhatra (U. P.)' *A.I.* 8, 1952. 56-58.

[17] *Op. cit.* [16], 59

The Relationship Between the Chalcolithic Culture of India and the Chust Culture of the Farghana Valley, U. S. S. R.

by S. P. GUPTA

The Chalcolithic culture of Malwa and Maharastra in India is probably the most discussed topic of the present day Indian archaeology. Not that it embodies in it the remains of any great material culture, but there are some enigmatic traits in it which need clear understanding. Right now, we are more confused than clear, at least about the origin and the extra-territorial contacts of this culture.

On these issues, scholars in India are divided in two clear-cut camps. One holds that its roots go deep into the Harappa culture and there is little relationship of this culture with any culture flourishing outside India. The other maintains that although it is indigenous in origin, its roots merely touch some of the Harappan elements and it had quite close relations with some of the west Asian towns.

Recently, on these issues almost the same controversy and the same division of scholars have cropped up in the Soviet Union also. The Russian archaeologist Y. A. Zadneprovsky [1] is strongly of the opinion that the Chalocolithic culture of India had definite relations with the cultures existing west of this country. Without refuting Sankalia's theory of the Iranian influence over the Indian Chalcolithic culture, he presents the Chust culture of the Farghana Valley as a strong centre with which the former maintained a close contact. As against this A. V. Shchetenko [2], another noted Russian archaeologist, holds the view that the Chalcolithic culture of India is purely indigeneous, both in origin and development. He strikes a note of dis-agreement with Sankalia and Zadneprovsky that there was any significant influence from Iran, or contact with the Farghana Valley.

In the following pages an attempt has been made to introduce the Chust culture and examine its claim of being another complex with which the Chalcolithic culture of India shared some common features.

The Chust Culture

The Farghana Valley is some 300 km. long area on the upper reaches of the Syr Darya. It is surrounded by the mountain ranges of the Chatkal, Farghana, Alay and Turkestan. The western half of this cup-shaped valley is arid and desert, while the eastern half is fairly green. The valley occupies a central position amongst the Central Asian republics of Kirgizia, Uzbekistan and Tadjikistan.

The sites

In 1950 an ancient habitational mound was explored about 2 km. north of the modern town of Chust on the right bank of the Syr Darya. It was excavated by Voronetz and Sprishevsky for nearly a decade. In the meantime the valley was systematically explored and more than 40 sites of the culture encountered at Chust were found, mainly in the eastern half of the valley. One of these mounds, called Dulvergine, is being very ably excavated by Zadneprovsky for the last nine years. The site, 33 km. from Chust, is situated on the left bank of the river Kara Darya, a tributary of the Syr.

Cultural Deposit

The entire thickness of the deposit, about 4

metres, has been divided into three structural levels. However, the culture does not show any significant change either in pattern or in details in any of these levels.

Fort and House

Dulvergine was a large fortified town with 4 to 6 m. thick walls, the extant height of which is upto 2.5 m. at places. The houses consisted of rectangular rooms, having floors plastered with clay. The walls were made of mud-bricks of $52 \times 22 \times 8$ cm. size.

Metallurgy

Within the habitation were also found remains of furnaces for smelting bronze ; on one earthen pot there were small lumps of molten bronze still sticking. The presence of a number of stone moulds with designs of ear-rings, handled mirror, knife, etc. conclusively prove the existence of a developed stage of metallurgy. It is important to note that the metallurgy of iron, along with that of copper and bronze, was known to the people, although, it was used in a very restricted quantity.

Storage pit

One of the most interesting features of the pattern of habitation was the presence of numerous storage-pits, many of them were a metre and more deep. The base of such a pit was flat and the sides were tapering—the whole thing looked like an inverted funnel. They at once remind us of the so called Neolithic 'Pit-Dwellings' of Burzahom, Kashmir Valley, and incidently raise a doubt in our minds, if they were really meant to be underground houses.

Domestication of Animals and Cereals

The economy of the people was mixed which included the cultivation of wheat, barley and millet, and stock raising of cattle,camel, sheep and goat. It is important to note that horse was also domesticated as is evidenced from the presence of 20 pieces of different bones of this animal in the habitation area and the stone-moulds for horse-bits.

The small antiquities used in everyday life of the people included the following :

Stone objects

(*i*) Crescentic harvesters of slate stone or natural pebble, usually pecked and groud to bring out the desired shape of the tool and sharpness of the cutting edge. The concave edge prominently shows areas of sheen and polish, resulting from considerably long use of the tool.
(*ii*) Ring stones of flat pebbles having hour-glass perforation. Sometimes, these are slightly ground.
(*iii*) Shouldered axe-shaped hammer-stones with dent-marks on the broad surface.
(*iv*) Ground stone peckers.
(*v*) Flat oval pebbles with constricted sides produced by bifacially notching the central part of the two longitudinal sides and by removing two or four deep flakes. Probably, these were used as net-sinkers.
(*vi*) Quern and pestle.
(*vii*) Long rectangular pendant with a neck or hole at the top.

Bone objects :

(*i*) Long comb with 3 to 5 teeth at both the ends ; probably, used in weaving.
(*ii*) Perforated disc.
(*iii*) Pieces of long bone with one surface polished ; probably, used for skating.

Terracotta objects :

(*i*) Perforated disc made out of pot-sherds.
(*ii*) Spindle whorls.
(*iii*) Beads, barrel-shaped.
(*iv*) Cones.
(*v*) Ear-rings.

Copper objects :

(*i*) Socketed spearhead.
(*ii*) Convex edged knife with knobbed handle.

(*iii*) Perforated needle.
(*iv*) Barbed and leaf shaped arrowheads; socketed.

Iron objects :
(*i*) Knife.

Pottery

The pottery of the Chust culture is to be considered in greater detail since according to Zadneprovsky, it shows some unmistakable similarity with the Indian Chalcolithic pottery, particularly, of the Malwa fabric [3]. The following observations are mainly based upon the collection from Dulvergine which I had the opportunity of handling personally at Leningrad by the courtesy of Zadneprovsky.

The Chust pottery is rich and varied. The pots are usually well shaped, although all are hand made. They present a variety of coloured slips : red, dark red, orange, grey, dark grey, whitish and their several shades. When the surface is thoroughly burnished and the slip is consistently applied, the pots show some brightness, extra gloss, and a little oily feel. But, by and large, the surface is dull, matt and crackled. When the thickness of the walls is from thin to medium, the core is completely red, indicating perfect firing, but when it is thick, the core is grey in its central portion, showing the effects of incomplete firing. Usually the pots are well-backed. The texture of the clay is always slightly rough due to the presence of observable sand grains. The majority of the pots are plain, but those painted use black or rarely, blackish white pigments. All the designs are geometric, except one showing a man with a raised hand. We do not know the whole composition of this panel since the sherd on which it appears is broken from the middle. The designs are well executed and the panels are crisp and clear. First the outline of each item is delineated with a thick brush, and then the bounded space is filled either by hatching or by solid filling with the help of a thin brush. Sometimes this work is done rather swiftly, with the result that the lines trespass the boundary. On the whole, however, the painted pottery of the Chust culture is fine and exhibits a good taste and variety.

The pottery types which are compared with those found at Navdatoli are :

(*a*) High necked vessels with concave neck and flaring rim.
(*b*) Hemispherical bowls with everted rims.
(*c*) Sub-oval bowls.
(*d*) Carinated bowls with straight sides.
(*e*) Solid stems with flattish base (probably, belonging to pedestalled wine cups).
(*f*) Spouted bowls (with very short tubular and obliquely cut spouts). One painted spout is spoon shaped.
(*g*) Storage jars.
(*h*) Flat dough plates.

Zadneprovsky particularly stresses the importance of the everted rim bowls, high-necked vessels, carinated bowls and spouted bowls.

The comparative painted designs are as follows :

(*i*) Horizontal bands.
(*ii*) Horizontal straight lines.
(*iii*) Triangles forming a net pattern, vertically arranged.
(*iv*) Rhombs.
(*v*) Chess-board pattern.
(*vi*) Opposed triangles (double-axe design),
(*vii*) Filled triangles.
(*viii*) Circles into rhombs.
(*ix*) Simple decoration of the inner ring.
(*x*) Parallel wavy lines.
(*xi*) Groups of vertical or oblique strokes (4 to 5 strokes).
(*xii*) Cross.
(*xiii*) Human figure (only one example).

Burial custom

The people buried their dead under the floor of the house in the flexed position. Apart from these, some separate skulls were recovered from different cultural strata.

7

Physical Type

The skulls show that the people belonged to the Europeroid long headed Mediterranean type. This type was common in South Turkmenia during the Bronze Age. It is on this score that Zadneprovsky visualizes the migration of a people from South Turkmenia to the Farghana Valley. These people eventually formed the Chust culture during the late 2nd millennium B.C.

Evaluation

To begin with, the Chust pottery does show some similarity with the Malwa ware. The colours of the slip ranging from orange to deep red, in shades common with the Chalcolithic pottery, show a striking similarity. The appearance of dull matt surface with traces of cracklings is conspicuously present in both the potteries. Similarly, individual items of painted designs as listed by Zadneprovsky also show similarity. About commonness in pottery shapes at least bowls with everted rim and carinated neck do show identity. The other shapes listed above also reflect some distant resemblance. So much in favour of Zadneprovsky.

Now, let us examine these points from all angles and also consider some other aspects not raised by him.

Let it be stated at the very outset that the two potteries basically differ in the mode of manufacture. The Indian pottery is largely wheel-turned while the Uzbekian is completely hand made. The similarity in the shades of the red slip is such which does not call for a common source of emergence. So is also the case with the crackled and matt appearance of the surface. In cases where the surface is not burnished or the clay is not well-levigated, crackling may appear in the course of firing itself; in some cases even while the pots are being sun-dried. This happens because of the readjustment of the clay particles when the moisture evaporates. However, mixing salt in the slip, or throwing salt in the kiln during firing, also leads to the similar result. Whatever might have been the reason, none can be considered as a tangible ground for a common source, or origin.

The similarity shown in the painted designs ignores one of the fundamental principles of archaeological studies. A painted panel or a painted design is a complete unit in itself. It is the outcome of a unified thought or imagination in which the component items are meaningfully joined. Each panel is like a complete word consisting of individual items which serve as letters. A whole design is like a sentence expected to convey a complete idea. As the two words are identical only when their spellings are identical, so also the two panels are comparable when the placement of their individual items is identical. Similarly, when we have to compare a sentence with another sentence, we have not only to see the presence of identical words but also the identity in the order of their arrangement. The same rule should be applied in the case of deigns. A design should be compared with another design only when there exists an identity in the arrangement of the panels. As at no stage can we break a word or a sentence in individual letters for purposes of comparison, so also at no stage should we break the panels and the designs into individual items for comparison.

A deviation from this principle is possible in the case of representational art involving faunal and floral motifs. The reason for this shift in principle is simple. In the case of figure, it is the style involved in the portrayal that is specialized and passed on, or imitated, in the course of time. Due consideration should, therefore, be paid to the subject matter and the style of its delineation when the problem of comparison is raised.

Applying this principle, the long list of the comparable geometric designs proposed by Zadneprovsky is reduced to a very short one. It might, at best, include solid or hatched triangles and lozenges arranged in a row around the neck, opposed triangles placed apex to apex in a frieze, and vertical or horizontal lanes or ladders with trellis hatching.

However, even this comparison raises a very vital question for the protohistorians :

What is the distribution of even the comparable designs during the 2nd and early 1st millennia B.C. ? These geometric designs can be seen at several places in Iraq, Iran, Central Asia, China and India. Therefore, they do not seem to be so specialized as to warrant a common source of origin or contact. In fact, reliance should be placed more in the case of floral and faunal motifs found in identical styles. The geometric designs, unless these are of rare type, should not be used as a good evidence of cultural contacts. They are usually more generalized in character and widespread in time and space. In fact, the same objection stands against E.A. Ansari's work in which he has tried to show the Iranian influence on the Chalcolithic pottery of India. Not that such an evidence is no evidence but it is only of a circumstantial nature which is always of second rate value. Judging from this angle the forms of the Chust earthen pots and pans also show only a general similarity, except in the case of bowls with everted rim and bowls with carinated neck. The high necked jar does not show overall similarity. The similarity in neck and dissimilarity in the body profile in the examples of the two assemblages would vouch for their non-comparable character than for their comparableness. The spouted vessels from the Chust sites have extremely short spouts, hardly 2 to 3 cm. long. The spouts are of tubular and obliquely cut varieties, found slightly below the rim. Although such spouts are also found in the Chalcolithic sites of India, their real source lies in the neighbouring Keltminar Neolithic culture of Kazkhastan. In fact when Sankalia talks of comparable spouted bowls and vessels of India and Iran he means long channel-spouted bowls where the spout emerges from the rim itself, and the long tubular spouted vessels where the spout is about $\frac{1}{3}$ of the height of the vessel. The short spouts and lips existed in India in the southern Neolithic culture, their origin need not be traced to any outside contacts. In the absence of real channel spout or long tubular spout in the Chust complex, one would hesitate to produce the spouted pots for comparison with the Indian types. Short-spouted pots seem to be of local origin in both the regions.

There is a disc based solid stem in the Chust collection which is supposed to be identical with the stem of wine cups found in hundreds from the lowest levels of Navdatoli. In the absence of a complete example, or a cup having at its base the remains of a stem, the question remains open.

The comparison shown in the case of shallow flat dough plates and storage jars also suffers from the lack of traits of any specialized character. They are quite common in ancient Asia.

But can we say the same thing about the identity that exists in the shape of the bowls ? The fact of the matter is that these shapes are very simple and basic, and are found from the 3rd millennium B.C. onwards from Egypt to China and from China to India. Recently, similar bowls with everted rim have been discovered in the Persian Gulf sites excavated by a Danish Expedition [4]. Therefore, even though the existing identity cannot be denied, their simple character coupled with their wide distribution in time and space would relegate this evidence also a little in the background.

The overall image that emerges out of this discussion is simple : so far the evidence of pottery is not very convincing in establishing any real contact between the Chust culture of the Farghana Valley and the Chalcolithic culture of India, although some similarity in the non-specialized pot forms and painted designs does exist. But this can only show that these two cultures shared the general tendencies of the time prevalent in this part of the world. However the diffusion of individual items cannot be pin-pointed with any amount of certainty and, therefore, at the present state of our knowledge any real contact between the two potteries is not in the sight.

A close scrutiny of the other items of the

Chust complex also does not help us in visualizing such a contact. The two cultures significantly differ not only in their material elements but also in their moral behaviour. No doubt, both bury their dead under the floor of the house, but in India multiple pot-burial and extended burial were adopted while in the Farghana Valley it was the crouched burial which held the sway.

Since the pattern of economy was agro-pastroal in both the cases, their tool-kits show a few common items, e.g., perforated ring, quern and pestle, net-sinker, spindle whorls, perforated disc, but these are also of wide distribution among the Neolithic-Chalcolithic cultures of the Old World. So is also the case with the domesticated animals and cereals. However, it may again be noted that only the Chust culture had horse-breeding and not the Indian Chalcolithic.

The two complexes also differ in metallurgical achievements. While the Indian complex is devoid of any knowledge of iron, the Chust complex presents the evidence of the use of iron implements, right from the very beginning.

The two cultures also differ in their habitation-pattern. All the Indian sites, known so far, are open villages while, Dulvergine, the site opened by Zadneprovsky is definitely fortified.

About the racial connections of the two peoples, it may be stated that the people with Mediterranean features were present in South Turkmenia from the 4th millennium B.C. onwards. These were also present in Khorezm (Northern Turkistan and western parts of Kazkhastan) in the Neolithic Keltminar culture of the 3rd-2nd millennium B.C., and they are also found in India from the 3rd millennium B.C. (Harappa culture) onwards. With this antiquity of the Mediterranean stock in both the countries, the argument of racial affinity to prove the cultural contact in the early 1st millennium B. C. is not well founded.

The two aspects of time and space also do not help us very much in visualizing the proposed contact. There are two dates for Dulvergine :

(*i*) circa 2720 ± 120 B.P., i.e. 770 ± 120 B.C.

(*ii*) circa 3050 ± 120 B.P., i.e., 1100 ± 120 B.C. (B.P. is counted from 1950)

Without twisting these dates in one way or the other, the Chust culture is to be bracketed between circa 1100 and 770 B.C. which coincides not only with the fag end of the Chalcolithic culture in India (bracketed c. 1800-1000 B.C.) but also with the Early Iron stage of this country. During this period the tradition of painted ware had already come to an end, what remained was the plain Black-and-Red ware with its associates of plain wares of dull red and grey colours. This is the stage of Nagada II, Bahal II, Eran II and Prakash II. The time-scale shows that the Chust culture is also contemporaneous with the Sialk VI stage. In this period iron was in common use in Iran. Its early stage also coincides with the end of the Namazga VI stage and the whole of the Yaz Depe I stage of South Turkmenian chronology. This was the time when iron had been introduced in Turkmenia also. It, therefore, appears quite reasonable that the Chust culture should be placed within the general framework of the early Iron stage cultures of Iran, South Turkmenia and India and not in the pool of the Chalcolithic culture of the Indian peninsula.

The factor of gap in space is also worth noting, although it may be argued that in future it might be filled up. The spatial gap between the Farghana Valley and Central India in which the Chust or the Indian Chalcolithic sites have not been found is very vast. The Chust culture is in fact a Valley cutlure with a definite local bias. Whatever traces of foreign elements are seen in it they seem to be from the areas a few hundred kilometres around the Valley, and not from thousands of kilometres away. As mentioned above, so far, more than forty sites of this culture have been located, but not even one outside the valley. That again shows the strong localized character of the culture, and simultaneously raises a doubt in our minds if the Central Indian Chalcolithic culture and the Chust culture could possibly have maintained the physical contact, directly or indirectly, as has been visualized by Zadneprovsky.

NOTES

[1] Y. A. Zadneprovsky, *Ancient Agricultural Chust Culture of Farghana*, (Moscow), 1962, (In Russian).

[2a] A. V. Shchetenko, 'The Problem of Origin of the Aneolithic of Central India', Ancient India, (Moscow), 1964, 31-43 (In Russian).

[2b] 'The question of Indo-Iranian Relation of Post-Harappan time', *The Reports and Informations of the U.S.S.R. Archaeologists*, (Moscow), 1966. The booklet published on the occasion of the VIIth International Congress of the Pre-historic and Proto-historic Sciences, Prague. (In Russian).

[3] Ibid, 102-107.

[4a] P. V. Glob and T. G. Bibby, 'Arabian Gulf Archaeology, *Kuml*, 1964, 90, Fig. 3.

[4b] A Neo-Babylonian Burial from Bahrain's Prehistoric Capital, *Kuml*, 1956, 165, Fig. 2.

Alamgirpur and the Iron Age in India*

by O. P. TANDON

The purpose of this paper is to discuss afresh, the beginning of iron in India in the light of the evidence from Alamgirpur, and analyse the implications related with the ushering of the Iron Age in India.

Archaeological Evidence—Alamgirpur

With the discovery of Alamgirpur [1] in 1958, the Harappan [2] culture was seen for the first time to have entered Ganga-Yamuna Doab. The subsequent excavation of the site in 1959 revealed yet another significant detail for the first time—the association of iron objects with the PGW deposit. As we shall presently see, the deposit was found overlying the earlier Harappan culture remains. The Harappa, the PGW and the post-PGW deposits at the site show three distinct cultural entities with no possibility of overlap. The excavators [3] were also fortunate in discovering that the above-noted cultural periods were separated from each other by a thin sterile layer signifying desertion following both the Harappan and the PGW occupation of the site. This circumstance of the PGW deposit at Alamgirpur together with its association with iron may have an important bearing on the chronology of the Iron Age in India. It is, therefore, proposed to examine the stratigraphy at Alamgirpur in greater detail. The total cultural deposit at Alamgirpur is about 3.66 m. in thickness. The Harappan levels are represented by a 1.83 m. thick deposit of compact and brownish earth. On the other hand the PGW levels with an average thickness of 1.37 m. were loose with frequent bands of burnt earth and ash. The break between the two periods (I and II), besides being cultural, was demonstrated by a thin stratum of a hard and whitish deposit, signifying a long exposure. Over a large portion of the mound this surface was found strewn with small weather-worn potsherds. The deposits of Period III with an average thickness of less than 30 cms. were confined to certain areas of the mound. The gap between this and Period II was again very clear, represented both by the cultural complex as well as the composition of the deposits. An intervening exposed surface was also marked at some places. The ceramic of Period III did not include NBP, a ware which has been commonly following the PGW at other sites in the Upper Gangetic Basin, but was dominated by the Early Historical Red Wares. The deposits of Period IV belonged to very late medieval times and were characterised by 'glazed' ware pottery and structures built of *Lakhauri* bricks. We thus find that the four cultural periods noticed here bearing unmistakable traits of their respective cultures, were separated from each other in similar unmistakable terms.

The sequence of the cultures at Alamgirpur, as seen above, provides a very significant position to the PGW deposit, as these levels are very distinctly defined. Certain ceramic types in red ware found at Hastinapur and Rupar in association with the NBP ware are found to occur in the Period II at Alamgirpur. Then there is a low percentage of the PGW as compared to the plain grey ware and red wares. These occurrences, when taken together with the discovery of iron objects throughout Period II deposits, place this PGW assemblage to a late phase of this culture. The iron objects include a spear-head, arrowheads and few nails and pins. (Details of objects are given at the end of this paper).

* The author records gratefully his acknowledgement to Dr. K. K. Sinha and Shri D. P. Agrawal for various suggestions in writing this paper and their helpful discussions on the problem of the interpretation of radiocarbon determinations.

Evidence from other sites

Having discussed the cultural compositions and the stratigraphy at Alamgirpur, let us now compare the results from other sites yielding PGW and iron objects. Earlier to the evidence from Alamgirpur, Hastinapur [4] was the only site from where iron was suspected in the form of slag from the uppermost levels of the Period II [5], i.e. the PGW deposit. The deposit of Period II follows the levels of Ochre-Coloured ware, the identity and age of which is yet to be established. Then, due to floods, Period II people deserted this site. The site was again inhabited after an appreciable lapse of time in Period III, which is characterised by the NBP and its associated wares.

The next important evidence is from Atranjikhera [6]. Although in all six cultural periods are reported, we shall examine in the present context the three pre-NBP periods. The earliest cultural level at Atranjikhera is represented by Ochre-coloured ware, similar to that obtained from the lowest levels of Hastinapur [7] and Bahadrabad [8], according to the excavator. The Period II, is marked by the occurrence of the black-and-red ware along with black-slipped ware showing almost common techniques and shapes and red slipped and unslipped wares. The Period III is represented by the PGW. Though PGW is the characteristic pottery, it occurs along with plain grey,black-and-red, black slipped, and slipped as well as unslipped wares. The incidence of PGW is reported to be between 3% to 10% of the total pottery complex which does not seem to be much. This ware and the thin plain grey ware show a remarkable similarity in shape, fabric and technique to the black-and-red and black slipped pottery. In the post-PGW Period, both PGW as well as plain grey ware show degeneration. Gradually PGW disappears but plain grey ware continues for a much longer time. On the other hand, the black-slipped ware shows a continuous process of improvement, particularly in fineness and lustre and perhaps develops directly into the NBP ware. In view of the complex evidence only a critical study of the associated red ware types in various cultural periods will present a clearer picture. Iron tools and implements have been found in all the sub-phases of the period. These include spear-heads, arrowheads, knives, an axe, a pair of kitchen tongs (the latter two from the late sub-phases) and two, probably, fish hooks. As there is an overlap of the cultural material it would also be important to work out the frequency and the distribution of tool types in the sub-phases to enable us to work out a better chronological sequence. The overall picture that emerges from the brief interim notes of Atranjikhera excavation is not so clear as that of Alamgirpur where all the levels are distinctly separated from each other.

In recent years further evidence of iron in association with the PGW has come from Ahichchhatra [9] Distt. Bareilly, U.P., Bairat [10] in Distt. Jaipur, and Non [11] in Distt. Bharatpur of Rajasthan. So far, there is no evidence of the occurrence of iron being found stratigraphically below the PGW deposits anywhere [12].

Chronology

Archaeologically speaking, the users of the PGW were, therefore, the earliest people to introduce iron in India. Lal [13] worked out a chronology of c. 1100-800 B.C. for the PGW levels at Hastinapur. The excavators of Atranjikhera, working on the basis of a solitary C-14 date of 1025 B.C. [14] relating to the early phase of PGW culture, inferred that the users of this ceramic settled down in the Ganga Valley around 1200 B.C. [15] Samples from other sites have given much later dates. We have to guard against the tendency of depending too much on stray radio-carbon determinations [16] particularly for sites like Atranjikhera where cultural levels both preceding and following the PGW deposit do not appear very firmly defined. In this respect the evidence from Alamgirpur is much better placed. Now, even if Lal's chro-

nology of Hastinapur is accepted, the upper levels of PGW which yielded iron cannot be dated to c. 1000 B.C. A post 800 B.C. context is indicated for PGW both at Alamgirpur and Sravasti [17]. Having begun round 1000 B.C. the PGW may have survived upto 500 B.C., if not later. It will, therefore, be not logical to assume that wherever there is PGW, the deposit must be dated to 1000 B.C.

The above brief resume of the recent archaeological work would indicate that there is no good evidence to believe that the earliest occurrence of iron can be pushed to c. 1000 B.C. Perhaps a date of *circa* 800 B.C. for the earliest known use of iron seems more appropriate.

Chronological Controversy

Discussing the antiquity of iron, Gordon [18] stated that there is no iron earlier than 400 B.C. in the Indian deposits. Wheeler [19] suggests that iron came into Northern India with the Achaemenids towards the end of the 6th century B.C. and the beginning of the 5th (as indeed in distant Britain). Kosambi [20] collating both literary and archaeological evidence, however, held, "Remembering that food gathering was so easy that less metal was needed, the date 800-700 B.C., therefore, seems to me a reasonable beginning for the Iron Age in India, meaning thereby specifically the Gangetic Basin where iron was most needed and most likely to have been worked". Banerjee [21] fixed the beginning of Iron Age in India to c. 1000 B.C. and made the Aryan endeavour responsible for spreading Iron far and wide within the sub-continent.

It may not perhaps be very much out of place to refer here that Banerjee and others have maintained that the Aryans were responsible for both introducing iron and PGW about 1200 B.C. (We have already questioned this early date). In the light of the Radio-Carbon determinations and other evidences it does not appear probable that Harappa Culture survived much beyond 1750 B.C. [22]. The commonly held belief that the 'Aryans' followed in the wake of the end of Harappan Culture (c. 1750 B.C.) needs to be reconciled with the supposition that the users of PGW were Aryans. But Banerjee does not answer the question, "What was happening in the period between 1750 B.C. and 1200 B.C. in India ?". Agrawal's [23] observations that the authors of the PGW belong to the second wave of the Aryan movement into our sub-continent deserves consideration.

The above critical study of the archaeological evidence of the PGW deposits from Alamgirpur and other sites in the Ganga-Yamuna Doab has shown that the beginning of iron in India does not go beyond c. 800 B.C. and to push it back further new evidence will be required which at present is lacking. The ushering of Iron Age in India invokes far greater horizons which have to be studied on a much broader canvas to be able to present a more complete picture.

Studies On The Iron Age

Recently there has been a good deal of writing on the problem of Iron Age, more precisely of the antiquity of iron in India, particularly in the direction of correlating the literary and archaeological evidence by Gopal [24], Singh [25], Kosambi [26] and Banerjee [27]. The discussion on literary evidence has mainly centred round the interpretation of the word *Ayas*, while the archaeological evidence has been rather uncritically utilized to push back the antiquity of iron to 1000 B.C. or earlier as by Singh [28], who says, "The Archaeological discovery and the literary evidence seem to be mutually corroborative, and 1000 B.C. may be suggested as the *provisional* date for the introduction of iron smelting in India." Attention in this connection may be drawn to D.D. Kosambi's scientific study of the problem wherein he has made a plea that the problem was to be viewed from the social and economic angle to assess the totality of impact of the use of iron in India [29]. One would have wished that Banerjee's [30] latest work, "Iron Age in India", which is a monumental reference work, had contained an analytical interpretation of the problems

linked with the total impact of Iron Age in India and answered the technological problems involved. The ushering of Iron Age is far more a complex problem for the simple treatment given to it by Banerjee.

Iron age and its implications

The problem of Iron Age is altogether different from the problem of the beginning or the introduction of iron in India. A distinction between the stage of mere occurrence of iron and the introduction of an Iron Age has to be made. The impact of Indian Iron Age has to be studied under the following headings :—

I. When did the smelting and exploitation of Indian iron ores start ?
II. The metal's role in the means of production; and,
III. The revolutionary impact that it had on the society, economy, and the polity.

These implications of the Iron Age have to be understood clearly so that its tremendous impact is properly appreciated. Mere possession of the iron objects—mainly weapons of war—and lack of a metallurgical know-how, will tend one to look for the source of the introduction of iron beyond the frontiers of this sub-continent. The present evidence or perhaps the lack of it points towards a foreign source [31]. The 'Aryans', the users of iron, might have come in contact with West Asian iron-working communities before entering this continent and had in this way gathered the knowledge of the use and smelting of iron. But there is hardly any evidence to show that they knew the Indian iron ores in the northern region and the Doab. The only two important iron ores in the northern region are at Mandi in Himachal Pradesh and Narnaul in Patiala [32]. Did the Aryans explore these as soon as they reached Panjab ? The best northern ores come from Bihar where the Aryans could not have reached so early, as the plains of the Ganga-Yamuna were completely covered with thick forests [33]. The Aryans came as nomadic intruders. They were constantly travelling on horses with their cattle wealth, carrying arms to conquer new lands. The next stage came when they started settling down in small groups. Only after this sedentary stage we can imagine them exploring the mineral wealth of the land and smelting iron from the local ores. From nomadic to sedentary phase of life is a great change. "The Ganges region did not see such a development until the Iron Age, for without iron implements it was impossible to clear its dense jungles". This transition may have taken considerable time.

Mere occurrence of a metal, therefore, is not the sole criterion to judge the ushering of the Age of that metal. Forbes [34] observes, "even areas into which metal objects have been carried by trade need not themselves be in the Metal Age." The discovery of iron heralds only the coming of the dawn. It is only the beginning of the day and not the day itself. The appearance of iron in the PGW levels is, therefore, only the beginning of the use of iron in a very limited sense and not the ushering of Iron Age in India.

(i) Metallurgical knowledge

The knowledge of the metallurgical processes is the most important factor. "No Iron Age could start from the knowledge of meteoric Iron alon." The Iron Age could be initiated only by a people who knew how to reduce Iron ore and had acquired the special knowledge of of working the bloom obtained from the ore. Until it is chemically established that the PGW iron is smelted from Indian iron ores or the evidence of smithies and smelting is found this criterion is not fulfilled in the Indian context. It has been further emphasized by Forbes 35", that only by considering both the chemical-technological aspects as well as the typological ones we can build chronological series and find out the trade-routes of metals".

(ii) Iron in the Means of production

At the time when the earliest settlements were coming up in the Ganga Valley the economy was rural, based mainly on agricultural production.

For the cultivation, the land was to be cleared of thick forests and then tilled with such implements which could be effective in the circumstances in the Ganga Valley. Unlike the valley of Euphrates, Nile and Indus, the Ganga Valley was full of thick monsoon jungles. A harrow effective in the silted deposits brought by the floods of Euphrates, Nile and Indus could not be used in the Ganga Basin for the obvious reason of the presence of roots and stones in the soil. It required a plough share far stronger and sharper than the stone or bronze could provide. Only iron could provide such an implement. The metal repertoire of the PGW includes objects which generally come under the category of the weapons of war. But the agricultural implements are conspicuous by their absence. Under the circumstances is it possible to credit these early settlers with the clearance of forests, making trade-routes and introducing agriculture on a scale where it can be termed as a food producing economy ? While with the dawn of 1st millennium B.C. people elsewhere began to use iron widely for weapons and implements, the picture of the society that emerges in India is very poor. The available though scanty evidence shows that the society was still in a pastoral and nomadic economic stage.

(III) Economic Revolution

The role of copper and bronze in mobilising the first Urban revolution in the West Asia is for too well known to be discussed here and beyond the scope of this paper but the analogy stands good in the case of the role of Iron that it played in bringing forth an economic revolution of far wider and deeper magnitude. "The iron was the cheap metal and it provided a tool of such hardness and sharpness that no stone, no other known metal could withstand it. Iron made possible field agriculture on a larger scale and the clearing of extensive forest tracts for cultivation" [36]. With agriculture becoming a reputable pursuit during this age, and agriculture production increased due to large-scale cultivation in the plains of Doab, the economy obtained a surplus base. Similarly the efficiency of industry was enormously increased. There was quickening of transport, trade and civic life. This surplus wealth lead to the second urbanisation in the Ganga valley. "This is not the place to trace in detail the growth of cities and monarchies in this valley. It is sufficient to point out that in a short period a transition took place from innumerable scattered, independent tribes, colonies, and city-states to a few large kingdoms which first swallowed up the remaining free settlements and then fought one another for supremacy and universal empire." [37]

The economic changes of the Iron Age also found political expression. In the south-eastern region of Bihar so full of iron ores of a very high grade, he Kingdom of Magadha rose, its political supremacy firmly established over other Kingdoms. The source of the Magadhan supremacy is to be located in its greater technological development. The Magadhans had the control over the supply of iron. This metal was worked out usefully and popularly and traded in abundance in the central Gangetic Basin. "This then, was Magadha's great source of power, for that state used the metal systematically to clear land and to bring it under the plough" [38]. The Hitittes [39] presented a similar example, beyond the frontiers of our sub continent in earlier times. "Its (Hitittes) prosperity was due pre-eminently to its soil's mineral wealth. Iron was particularly abundant there.... They were the masters of the mineral wealth and the "Iron Kings", by virtue of this fact and whether they liked it or not all Empires became tributary to them, and their skill in using the metal increased their wealth and power even

further. In a well governed and well organized empire like theirs commercial wealth of this kind could have been the stay of a true hegemony—especially with help of warrior people's arms and the Hitittes came very near to achieving it". It is commonly held that the Aryans, the users of iron in India, had come in contact with the Hitittes before entering this sub-continent and they had acquired the knowledge of the use of iron from them. When these Aryans reached the Ganga Valley and started exploiting the best iron ores in the country, the history was repeated. (We have already discussed the growth of Magadhan empire). The iron is found in abundance in the levels comparable to the period of the Magadhan supremacy and later on. A look into the metal repertoire of the NBP levels shows that the implements now include more agricultural implements than before.

An analysis of the implications of the Iron Age made in the foregoing pages establishes that the answer to the multi-faceted problem lies in chemical-technical-cum-typological studies. [40]

NOTES

[1] *Indian Archaeology* 1958-59 *A Review*, 50-55 (Hence after abbreviated as *I.A.R.*)

[2] R.E.M. Wheeler, *The Indus Civilization* (Supplementary volume to C.H.I.), (London), 1962, 3.

[3] The author was closely associated with the excavations at Alamigrpur conducted by Dr. Y.D. Sharma of the Archaeological Survey of India.

[4] B.B. Lal in *Ancient India* (hence after abbreviated as *A. I.*) No. 10 ;& 11 (Delhi), 1955, 6-150.

[5] Ibid, 13. Further small-scale excavations at Hastinapur in 1962 yielded finished iron objects from the middle levels of the PGW deposit. N.R. Banerjee, *The Iron Age in India* (Delhi), 1965, 216.

[6] R.C. Gaur, *Indian Prehistory*, 1964 (Poona), 1965, 142-145.

[7] Ibid, 10-11.

[8] A. Ghosh, *The Indus Civilization* : Its *origins, Authors, Extent and Chronolog, Indian Prehistory* 1964 (Poona), 1965, 123-124.

[9] N. R. Banerjee, *The Iron Age in India*, (Delhi), 1965, 1965, 216.

[10] *I.A.R.* 1962-63, 31.

[11] *I.A.R.* 1963-94 & 1964-65, Section I.

[12] S. D. Singh, *Ancient Indian warfare with special reference to Vedic Period* (Leiden), 1965, 101. His remarks that the earliest evidence comes from Kausambi is based on a misinterpretation of stratigraphy on that site. A characteristic PGW deposit is missing there.

[13] Ibid, 23.

[14] D.P. Agrawal, *et. al.*, in *Current science*, May 1964, XXXIII-9), 266.

[15] *Op.cit.*, 145.

[16] It has been emphasised by the scientists again and again that to arrive at meaningful chronologies, one should have cluster of dates or internally consistent sequence of dates. Solitary dates can often be deceptive. For Atranjikhera, too, unless we have a sequence of C-14 dates for various periods, no reliable chronology can be built on stray dates.

[17] Information from Dr. K. K. Sinha. A full report of the excavation o pending publication.

[18] D.H. Gordon, *The Pre-historic Bakground of Indian Culture* (Bombay), 1958, 155.

[19] R.E.V. Wheeler, *Early India and Pakistan to Asobka* (London), 1959, p. 24.

[20] D.D. Kosambi, 'The beginning of Iron Age in India, *Journal of Economic, Social Nistory of the Orient*, **VI (3),** 318.

[21] *Op. cit.*, 9, 239.

[22] D.P. Agrawal, *Harappan Chronology : A re-examination of the Evidence, Studies in Prehistory*, (Robert Bruce Foote Memorial Volume), 1966, 139.

[23] D.P. Agrawal, 'C-14 Dates, Banas Culture And The Aryans,' *Current Science*, March 1966, 5, 114-117.

[24] Lallanji Gopzal, '*Antiquity of Iron in India*', ***Uttar** Bharati*, **IX** (3), 71-86.

[25] S.D. Singh, 'Iron in Ancient India.,' *Journal of Economic ,Social History of the Orient*, V (2), 212-16 and Op.cit. 12.

[26] *Opcit.*, 20, 309-318.

[27] *Op.cit.* 9.

[28] *Op.cit.* 12, 102.

[29] *Op.cit.* 20.

[30] *Op.cit.* 9.

[31] Ibid, The author has discussed at great length the evidence of iron in the Ancient world and the possibility of a foreign source for the early iron objects associated with the PGW deposit.

[32] Ibid, 190.

[33] *Op.cit.*, 19, 118.

[34] R.J. Forbes, *Studies in Ancient Technology*, **VIII**, 7.

[35] Ibid, 15.

[36] K. Marx and F. Engels, *Selected ...orks* (Moscow), 1955, 311.

[37] A.K. Warder, On the Relationship between early Buddhism and other contemporary systems, '*Bull. of school of Oriental and African Studies*, 1956, 48. See also p. 46 for the impact of Iron Age towards the development of a scientific philosophical outlook in about 6th cetnury B.C.

[38] D.D. Kosambi, *The Culture and Civilisation of Anceint India* (London), 1965, 123.

[39] Marcel, Brion, *The world of Archaeology* (London), 1962, 311.

[40] The author is presently engaged in collecting data for the proposde study.

Typology in Prehistory*

by P. C. PANT

Some of the noted prehistorians of India have been saying for the past few years that we have enough of typology in Indian Prehistory and what we require now is to concentrate on stratigraphy with a view to giving proper stratigraphical horizons to different industries. Nobody can deny the importance of stratigraphy in the study of prehistoric cultures. but, at the same time, a question arises—Have we done enough of typological studies in India as compared to the standards followed in other parts of the world specially in Europe ? In fact we have over-simplified typology and our studies are, more or less, limited to very broad classification of implements and that too does not always agree with the patterns internationally followed. We still do not know the typical tool-types of the Middle Palaeolithic Culture or Middle Stone Age in India. We have yet to determine the percentage of Clactonian flakes and Levalloisian cores, flakes, points and blades in the different palaeolithic industries. It is even now a query before us whether all the industries of the different parts of the country, assignable to the second cycle of aggradation of Pleictocene period of India form one single culture or belong to the different cultures. All these questions may be answered with the help of scientific techo-typological studies of various industries.

Stratigraphy and typology are universally accepted as the two basic methods of the study of prehistoric cultures. As far as the former is concerned, a prehistorian has to seek help from geologists, soil chemists, palaeontologists,—palaeobotanists and similar other scientists, unless he combines in himself the qualities of a prehistorian as well as a quaternary geologist. Such prehistorians are of course rare in the world. So there is not much left for a prehistorian to do except to concentrate himself on typology.

Several scholars have attempted to provide proper definitions to different tool-types. The pioneer work on the typology of Palaeolithic period has been done by Bordes [1], Muller-Beck [2], Bosinski [3], Bohmers [4], Tixier [5], Sonneville-Bordes and I. Perrot [6]. The tool-types of the different Mesolithic cultures have been studied in detail by Clarke [7], Scherabedissen [8], Althin [9], Bohmers [10] and Barrière [11]. These prehistorians have given proper footing to the typological studies. The standards presented by them may be followed in India and other parts of the world.

Typological studies have proved to be of great help in solving some of the complex problems of European Prehistory. It is with the help of typology, it was concluded that 'Levalloisian' is not a separate culture, but only a technique which is to be found in all the Middle Palaeolithic cultures. The typological studies have also shown that 'Tayacian' is probably not a culture by itself and the so-called 'Tayac point' not a tool. Again, typology, in collaboration with stratigraphy, has provided the evidences to differentiate between typical Mousterian on one hand and the Mousterian of the Acheulian tradition, Mousterian of La Quina type, Mousterian of La Ferrasie type, Mousterian with toothed implements and Charentian on the other. The typological studies are also of much use in making a comparative study of the different cultures.

At the same time, let it be understood that we do not wish to overemphasise the importance of typological studies. On the contrary, it may be said that the conclusions drawn only on the basis of typology, without taking the stratigra-

*This paper was read in the 55th session of Indian Science Congress held at Varanasi in January, 1968.

phical evidences into consideration, are likely to be incorrect. Such a study is inadequate and unscientific. We have a very good example of such a study made by Burkitt and Camiade [12] in relation to the palaeolithic industries of south eastern India. They differentiated Abbevillian tool-types from Acheulian ones only on the basis of typology. The subsequent workers in the field took this division for granted, as if they were the two different cultures. But our recent studies indicate that nowhere in India they are found in different stratigraphical horizons, and they seem to be the two components of one and the same culture. For all practical purposes, at least in Indian Prehistory, Abbevillian and Acheulian have merely typological value.

Now we propose to summarise some of the general factors which should be taken into consideration while dealing with the typology of an industry.

Typology Versus Functions of Tools

There is a general belief, particularly in India, that typology and the functions of the tools go together and the former is largely based upon the latter. Our contention is that typology has little to do with the functions of the tools and both should be studied separately. The typological, classification of tools is based upon other factors viz., general shape of the tool,technique of manufacture, type, technique and angle of retouch etc. Since Prehistoric Archaeology is a concrete science, we should be objective in our studies. When we talk of the functions of the tools, particularly of the palaeolithic period, we mostly speculate and thus become subjective in our outlook, ignoring the basic requirement of the discipline as there are hardly any evidences to prove the functions of the tools. At the same time, we do not deny the importance of the functional aspect of tool-types. In fact we welcome such scientific studies which throw light on the functions of the implements. But they should be scientific and not speculative. The work of the Russian prehistorian Semenov [13] is an ideal before us.

Shape of the Tool

General shape of the implement is one of the factors which is taken into account in typological studies. For example a pear-shaped handaxe is differentiated from a triangular one and a 'U' shaped cleaver from that of 'V' shape. This phenomenon plays a very important part in the classification of microliths.

Technique of Manufacture

The particular type of technique, which has been employed in manufacturing the tool, is one of the deciding factor in typological classification. It is on this basis that a simple point is differentiated from a Mousterian Point and an Abbevillian Handaxe from an Acheulian one.

Retouch

With the exception of handaxe, cleaver, chopper and chopping tool, no artefact comes in the category of a tool unless it is also retouched. Then one has to take into consideration the type of retouch. For example, a flake or blade is an End Scraper only when it is steeply retouched to produce a convex working end.

Measurements

The measurements of length and width of the tools, the angle of percussion and that of retouch are very much helpful in making the comparative study of different industries. On the basis of these measurements one can prepare the different indices. For instance, if a tool measures 4 2 cms., the index will be 3. Such a study may lead an investigator to observe that a particular industry has a preference for a particular tool-type of a certain group of indices as compared to the other industry. The same is true about the measurements of the angle of percussion and that of retouch.

Statistics

The statistical studies have been recently introduced in Prehistory and have been fruitfully used

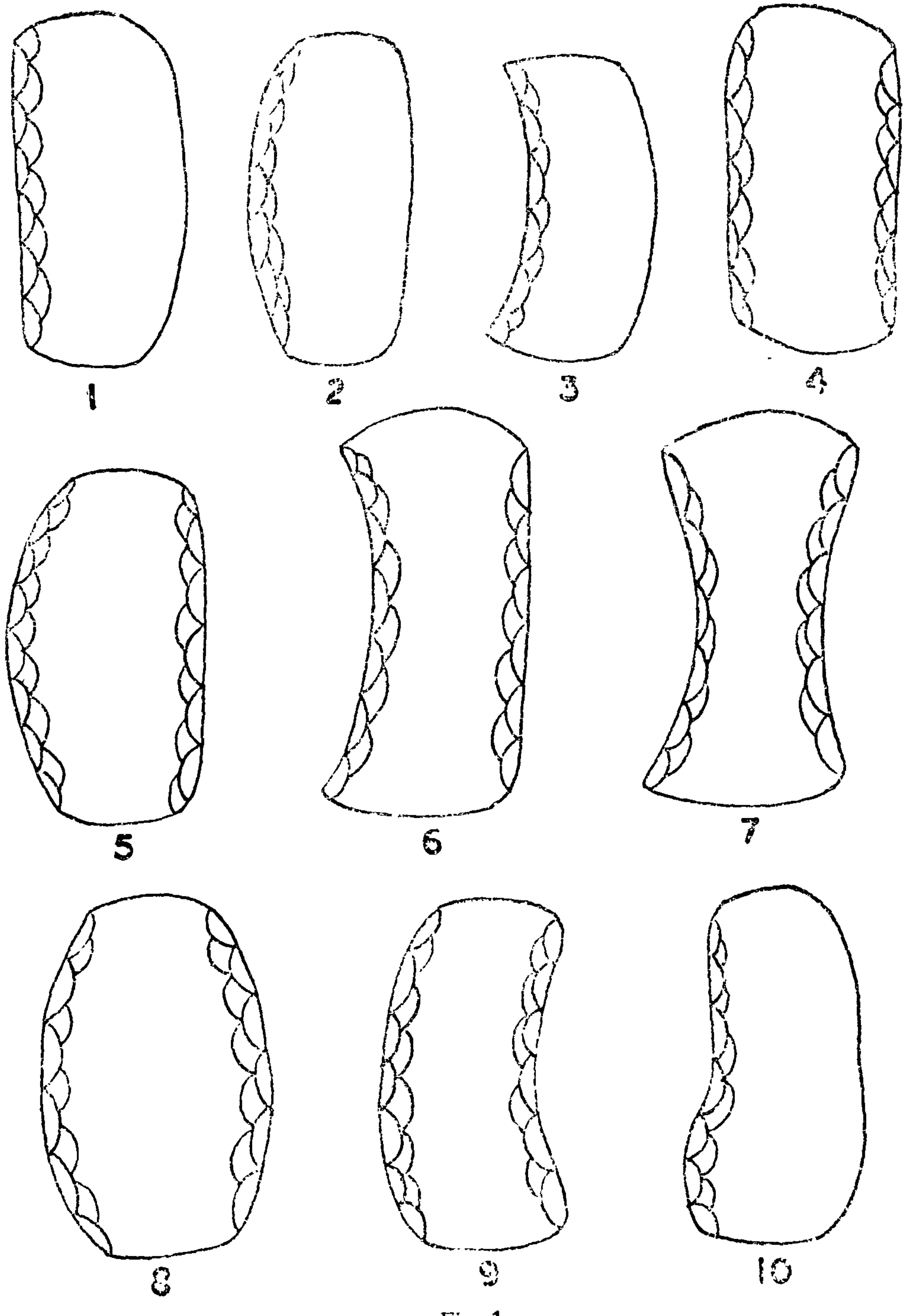


Fig. 1

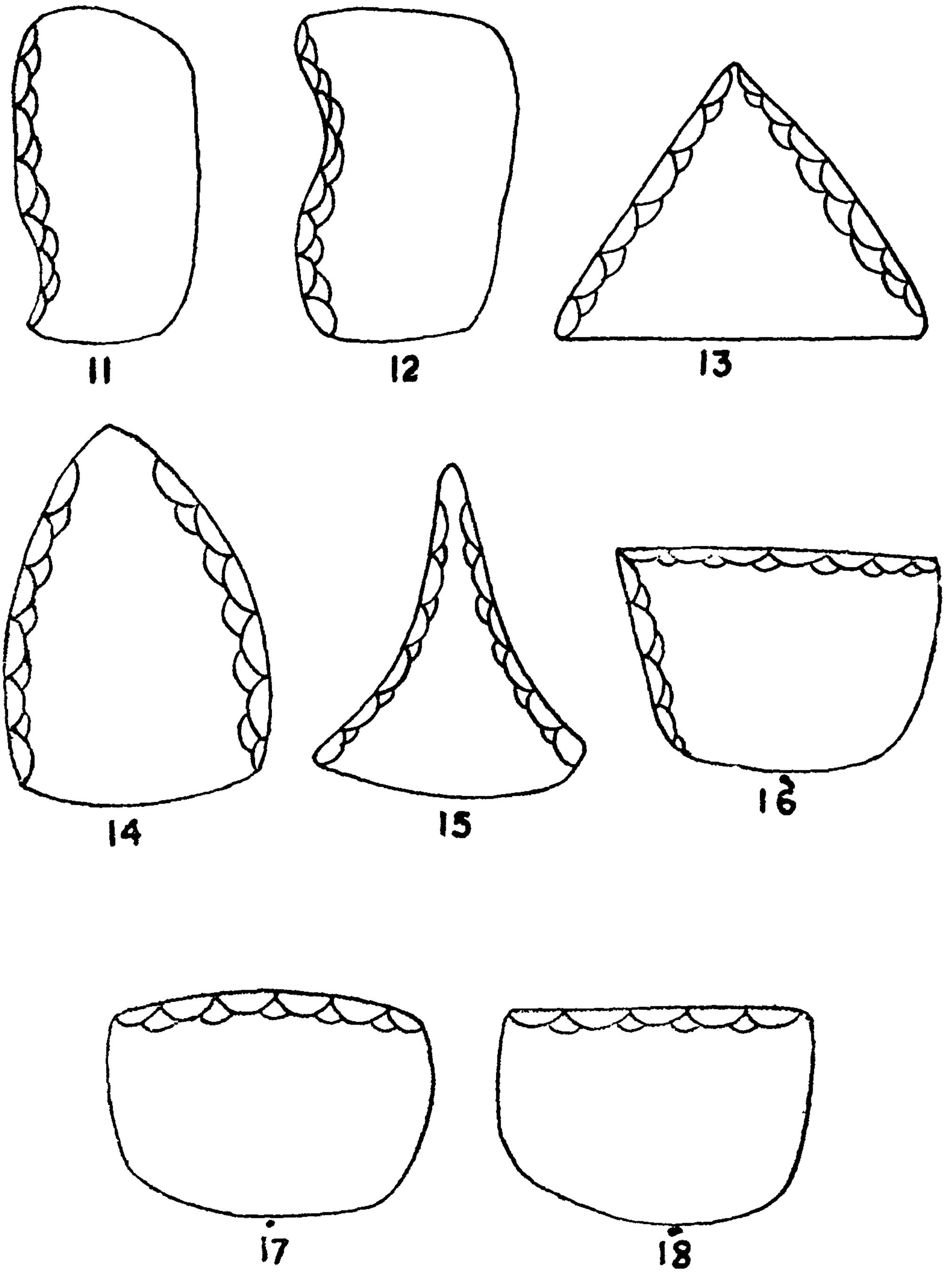


Fig. 2

by some of the European scholars [14]. For the purpose, one should calculate the percentage of each tool-type and notice the preference for one as compared to the other in an industry. The same can be presented in graphs, diagrams and tables. These methods are well suited for making a comparative study and enable us to present the results both concisely and legibly. The hollow or concave side scraper, for example is one of the important tool-type in the Middle Palaeolithic culture of India. The percentage can be calculated in the following two ways :—

A. $\frac{\text{Number of hollow side scraper} \times 100}{\text{Total number of side scrapers.}}$

B. $\frac{\text{Number of hollow side scraper} \times 100}{\text{Total number of implements}}$

Although different methods should be employed to different industries, depending upon their nature, the above mentioned are the general factors, which, in our opinion, should be taken into account in the classification of tools.

Types of Side-Scraper

If some of these methods are applied, we can classify the side-scraper into following main types. Ofcourse some more types may be recognised if we also consider the size of the tool and type and angle of retouch.

1. *Straight Side-scraper.* A flake retouched on one of the long sides resulting in a convex working edge (Fig. 1, 1).
2. *Convex Side-scraper.* A flake retouched on one of the long sides resulting in a convex working edge (Fig. 1, 2).
3. *Hollow or Concave Side-scraper.* A flake retouched on one of the long sides resulting in a concave or hollow working edge (Fig. 1, 3).
4. *Side-scraper, straight-convex.* A flake retouched on one of the long sides producing partly straight and partly convex working edge (Fig. 1, 10).
5. *Side-scraper, straight-concave.* A flake retouched on one of the long sides to produce partly straight and partly concave working edge (Fig. 2, 11).
6. *Side scraper, concavo-convex.* A flake retouched on one of the long sides to produce partly concave and partly convex working edge (Fig. 2, 12).
7. *Double Side-scraper, straight.* A flake retouched on both the long sides producing straight working edges (Fig. 1, 4).
8. *Double Side-scraper, convex-straight.* A flake retouched on both the long sides. One of the working edge is convex and the other straight (Fig. 1, 5).
9. *Double Side-scraper, concave-straight.* A flake retouched on both the long sides. One of the working edges is concave and the other straight (Fig. 1, 6).
10. *Double Side-scraper, biconvex.* A flake retouched on both the long sides. Both the working edges are convex (Fig. 1, 8).
11. *Double Side-scraper, biconcave.* A flake retouched on both the long sides. Both the working edges are concave (Fig. 1, 7).
12. *Double Side-scraper, convexo-concave.* A flake retouched on both the long sides. One of the working edge is convex and the other concave (Fig. 1, 9).
13. *Point cum-side-scraper, straight.* Both sides of a flake are retouched to make a point opposite the bulb end. The angle between the two straight sides is more than 45° (Fig. 2, 13).
14. *Point-cum-side-scraper, convex.* Similar to No. 13, but both the sides are convex (Fig. 2, 14).
15. *Point-cum-side-scraper, concave.* Similar to No. 13, but both the sides are concave (Fig. 2, 15).
16. *Angled side-scraper.* One of the long sides and the other lying opposite the bulb-end retouched to produce an angle (Fig. 2, 16).
17. *Wide Side-scraper, straight.* A flake retouched on the top side lying opposite

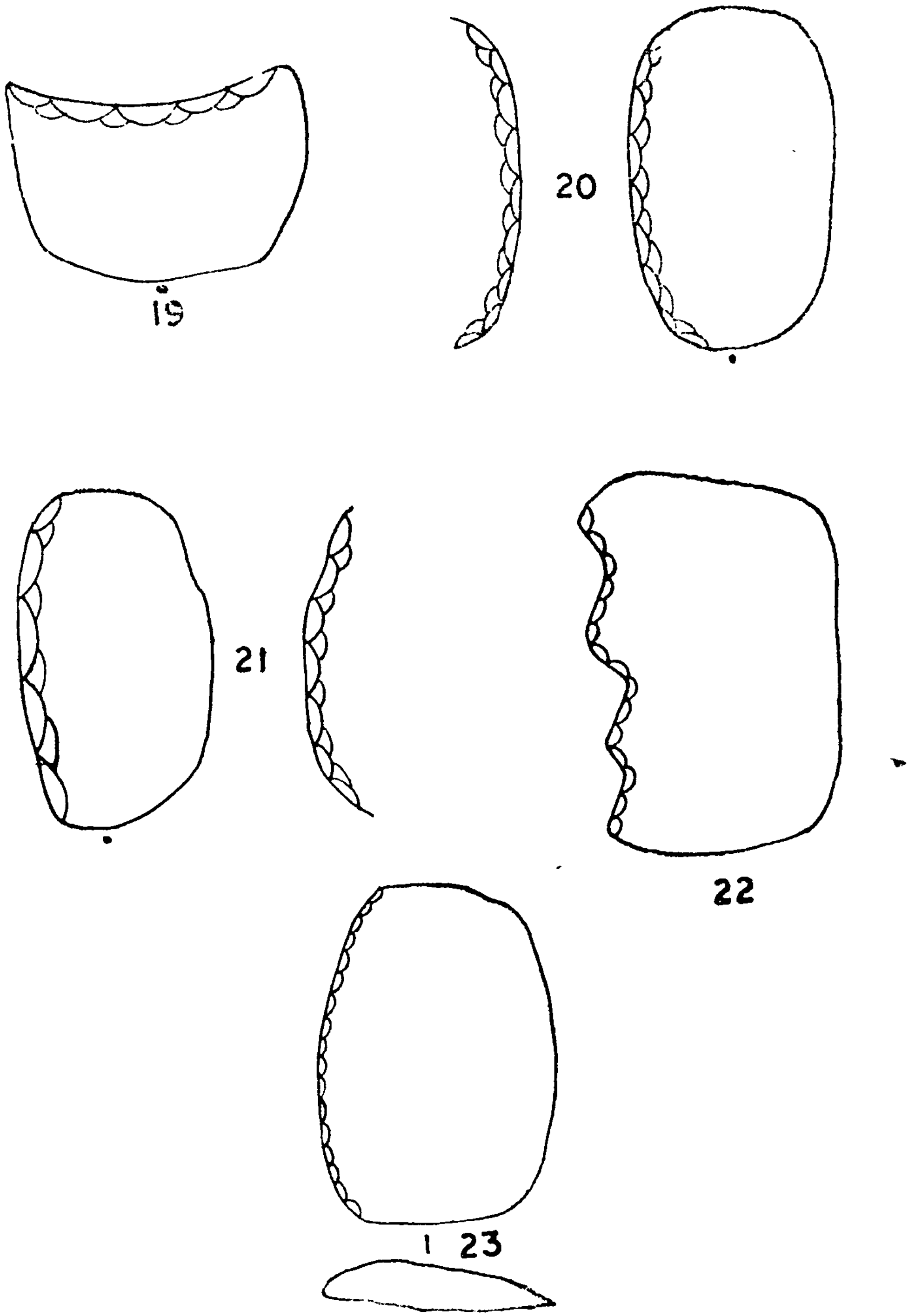


Fig. 3

the bulb-end, producing a straight working edge (Fig. 2, 18).

18. *Wide Side-scraper, convex*. Similar to No. 17, but the working edge is convex (Fig. 2, 17).

19. *Wide Side-scraper, concave*. Similar to No. 17, but the working edge is concave (Fig. 3, 19).

20. *Side-scraper with retouch on ventral surface!* A flake retouched on one of the long side from the ventral surface.

21. *Side-scraper with retouch on both the sides from alternate surfaces*. One of the sides of a flake is retouched from the upper surface and the other from the under (Fig. 3, 21).

22. *Side-scraper retouched from both the surfaces*. A flake retouched on one of the sides from both the surfaces (Fig. 3, 20).

23. *Side-scraper with short steep retouch*. A flake retouched on one of the long sides. The retouch is short and steep (Fig. 3, 23).

24. *Toothed Side-scraper*. A flake having more than one notch on one of the long sides, as a result of secondary work (Fig. 3, 22).

25. *Side-scraper on a core*. A side-scraper made on core.

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Patapadu Revisited : A New Painted Pottery Culture of South-East India

by I. KARTHIKEYA SARMA

I. Topographical Background

The village of Pātapādu [1] (15° 19′ North Latitude and 78° 10′ East Longitude), is in Banganapalle taluq of Kurnool district. It is about five miles west of Banganapalle itself on the Gooty road.

The village is in a low lying area surrounded by thickly grown fields. A river known as Jurreru flows along the southern fringes of the village with slight curves within the fields, in a west-east direction. A small hill range 'Ravvalakondalu' by name (ending at Bhanumukkala, near Banganapalle), gaurds its southern extent and another minor hillock projecting from the famous 'Yaganti' hill abounds the north-east of the village. These hillocks are the offshoots of the 'Erramalai' ranges and are locally famous for limestone and brown-slate, as also for diamond and copper mines. There is a big bungalow of the earstwhile Nawab of Banganapalle towards north of the present village over a hillock close to the right side of the Banganapalle-Gooty road.

II. Previous Exploration

The site was first visited by Robert Bruce Foote [2] in 1883. His observations were remarkable and in fact paved the way for the present search. Leaving apart the various pottery types and wares of the Megalithic and early historical sequences, his discovery of a milk bowl having a broad channel-lip (which Dr. Sankalia [3] compared to the one at Navdatoli and farther west in bronze age Crete, Anatolia and Iran), deserved much keener attention. Besides, in the same locality, i.e., " in the fields to the east of the Cache site ", as Foote informs us, were found several microliths essentially non-geometric in character and some short serrated blades and flakes of agate, chert and lydian stone. The recent explorations of H. D. Sankalia [4] and N. Issac, seem to have yielded only stone tools, black-and-red ware and other remains of the early historical period. In the year 1962 F. R. Allchin [5] also collected from the same site some painted pottery specimens. Allchin's collections seem to be very meagre and nothing is made clear as to their exact location within Patapadu village. Nevertheless, his observations are worth quoting here. " The almost complete absence of grey ware at Patapadu is accompanied by a dominance of red which superficially at least recalls the pottery from Chalcolithic assemblages in Maharashtra [6] and Malwa. This might lead one to infer that the Patapadu site contains intrusive elements which during the upper Neolithic found their way into this region from the Northern Deccan or beyond. *But this question demands further evidence and field work.* Whatever the precise affinities of the pottery, its general position seems to be well established."

This study constituted a good background coupled with the archaic meaning conveyed by the very name of the village, (Pāta = old and Pāḍu = refuse, heap or mound), tempted a fresh exploration of the site and environs. Besides, the author had studied the Madras Govt. Museum collections of Patapadu and allied sites of Bruce Foote [7]. A brief and general

A NEW
PAINTED POTTERY CULTURE
OF SOUTH-EAST INDIA
SCALE 0 50 100 150 KMS.
BOMBAY
HYDERABAD
PATAPADU
MADRAS
MYSORE
ARABIAN SEA
BAY OF BENGAL
AREA OF THE MAP
0 KMS 300
CEYLON
R. MUSI
HYDERABAD
R. BHIMA
KOSGI
R. KRISHNA
AMARAVATI
VIJAYAWADA
KESARAPALLI
NAGARJUNAKONDA
GUNTUR
MASULIPATNAM
R. KRISHNA
PAYANIGUDDA
KAVITAL
KALLUR
LINGSUGAR
UTNUR
PIKLIHAL
MASKI
R. TUNGABHADRA
KURNOOL
PENCHIKALAPADU
R. GUNDLAKAMMA
CUMBUM
PUSALAPADU
TEKKALAKOTA
PATAPADU
KUPGAL
HOSPET
PATTIKONDA
BANGANAPALLE
SANGANAKALLU
BELLARY
METTUPALLE
RAMAPURAM
BRAHMAGIRI
TADIPATRI
R. KUNDERU
R. PENNAR
PEDDANDLURU
CHILAMAKURU
NELLORE
CUDDAPAH
R. HUGRI
BAY OF BENGAL
MADRAS
R. PALAR
PAIYAMPALLI
MYSORE
R. CAUVERY
T. NARSIPUR
78°E
80°E
REFERENCE
CHALCOLITHIC SITES
NEOLITHIC SITES
MODERN TOWNS
PRK PRASAD

Map 1.

account of the recent discoveries made during the years 1962-63 [8] is given here.

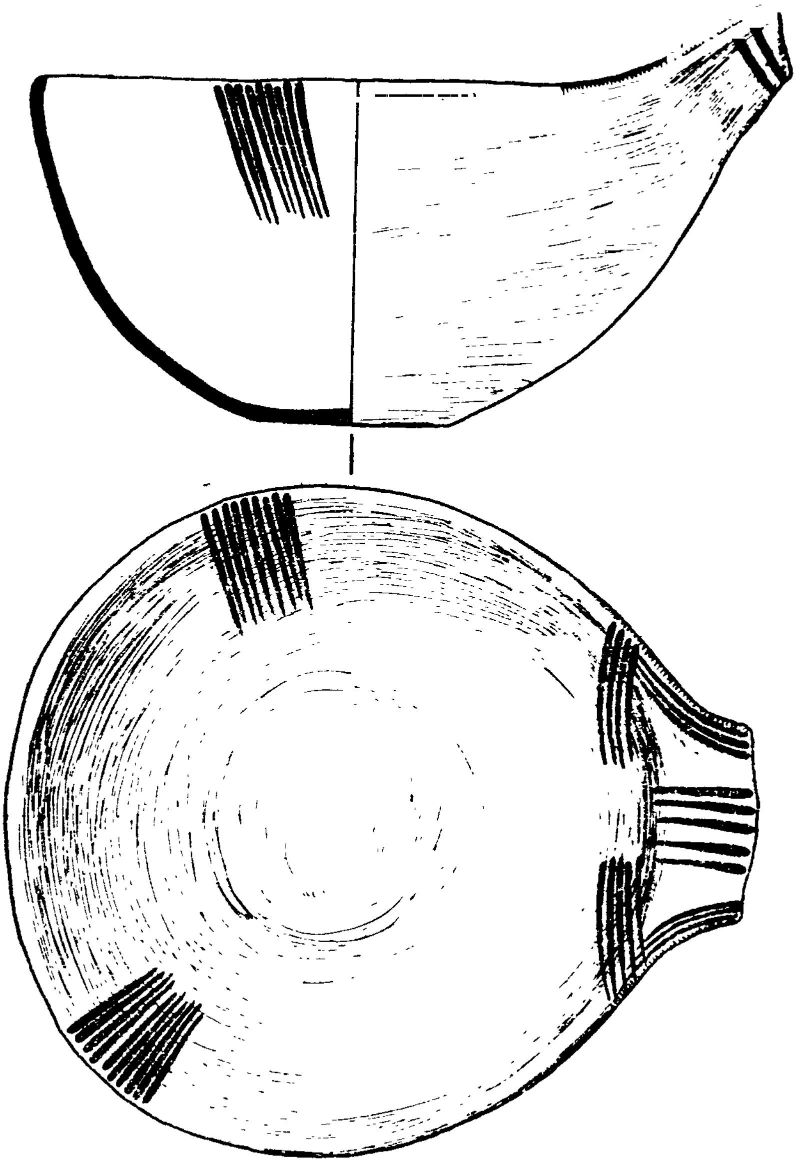

Fig. 1—Channelled Bowl from Patapadu; Bruce Foote's Collection, Madras Govt. Museum (1/3).

III. Present Exploration

Two ancient mounds were located within the village area. (1) On the western side close to the village covering an area of about 10 acres within the fields, (starting from the left side of the Gooty road and upto the reaches of the Jurreru river on the south), and the other, (2) A mile east of the village covered by the fields

and the Banganapalle—Gooty main road, (in between 29/4 and 29/6 mile stones).

1. West Mound

Exploration over and around this extensive mound yielded microliths of late stone age predominantly of jasper in various shades and a few fluted cores of chert and chalcedony. A few potsherds of red slipped, plain coarse red and grey wares pointed out a late historical sequence. A much ruined Śiva temple stood on the eastern edge of this mound where the village ends. This extensive mound is overgrown with vegetation and further search in a dry season may reveal some more finds.

2. East Mound

This is the most promising locality and fits in with the 'Cache' site of Foote [9]. It is about a mile away towards east from the village proper and a few yards south-east of the Nawab's bungalow. The present size of the mound is about 300 metres from east-west and 200 metres north-south and as big as the famous Chalcolithic mounds of Navdatoli. The main road from Banganapalle-Gooty bisects the mound and runs across it covering the apex. The river Jurreru flows past the mound on its south and within the fields. The local P.W.D. often takes resort to this mound for earth required for occasional repair of the road. Thus on either side of the road,it is much distorted by long trenches whereas the northern side is under cultivation, the southern extent left as a waste land owing to its (4 metre), elevation from the surrounding fields. Several rain gulleys yielded large quantities of painted pottery.

The right side extent of the mound is comparatively not much disturbed as the area is under cultivation but a canal cuts along the mound periphery on this side, which is dug by P.W.D. for the Jurreru reservoir.

IV. Results of The Exploration

The various finds encountered from the mound proper and its close vicinity fell under the following groups.

1. Pottery Wares

Though Pusalapadu [10] in Cumbum taluq is credited as the first painted pottery site discovered below the lower Krishna basin, Patapadu stands as the foremost in richness and variety of the pottery forms and fabrics of the Neolithic/ Chalcolithic sequence. The absence of the lower Neolithic pale grey, the meagre quantity of typical burnished grey in the present collections, as well as, in Bruce Foote's and Allchin's [11] the dominance of red ware of coarse to medium fabric with profusely painted surfaces alongwith short blades and ground stone axes etc. gave a fresh impetus for a thorough investigation.

(i) Painted Black-on-Red Ware

More than 200 sherds were picked up pertaining to this category. The fabric is from coarse to medium, the former being more common. They are hand made with a few doubtful exceptions for which turn-table may have been employed. The surfaces are dabbered and reveal intensive 'scooping', possibly with the help of a bunch of grass or a piece of cloth. Both the methods have been followed and one could actually distinguish them by seeing the inner surface of the utensil. The 'merge' marks are very distinct in vases and jars, which were made in parts and luted. The thickness of the potwalls is never uniform. The clay is composed of more grit, sand, and lime specks. It can be said from the majority of the fragments that the ware is subjected to medium firing. The thicker fragments possessed a black or smoky central core region. The slip is generally of dark red colour, (burnished in a few cases), sometimes brown or orange-red, affording a pleasing contrast to the painted black designs. These painted designs extended on the inner surfaces also, particularly in case of cups, bowls and basins.

In this group the unpainted red ware is also present in large quantities having all the characteristic features of the painted counterpart.

Paintings

They are executed in black pigment but rarely in lighter shades. They are most common on the exterior surfaces of the pots either at the neck or shoulder. Certain deep bowls, basins and channeled bowls contained paintings on the inner surfaces also. Both geometrical and naturalistic froms were found on them.

Geometrical Designs

(1) Horizontal bands either singular or in groups, (Pl. VI-18, 19; Pl. VII-10; Fig. 2-2, 9 and 12; Fg. 3-16, 25).

(2) Thick rim bands, (Pl. VI-4, 11, 13; Fig. 2-5, 6, 13).

(3) Close and plain lattice, (Pl. VII-2, 5, 9; Fig. 2-11; Fig. 3—17). Variants of these within horizontal bands and sometimes followed by vertical or diagonal lines (Pl. VII—1, 3, 4).

(4) Simple uprights or oblique lines from horizontal bands, (Pl. VI—3, 4, 14, 15, 20; Pl. VII-11, 21; Fig. 3—18, 19, 33).

(5) Oblique lines on the interiors of bowls and dishes, (Fig. 2—1, 3, 6, 7, 12).

(6) Short vertical strokes with pen-knife edges or buds terminating at the rim interiors of the bowls, small cups and vases with flared rim etc., (Fig. 2—5, 12; Fig. 3—15, 16, 17, 19, 20 and 21).

(7) Groups of thin and short horizontal or vertical lines at the lips interior of the channeled bowls, (Pl. VI—2, 6, 8 and Fig. 1).

(8) Circular bands on the flat interior of the bowl base, (Pl. VII—17).

(9) Cross-hatched segments, (Pl. VII—7), and triangles, (Pl. VII—8).

(10) Miscellaneous designs such as, wavy bands, (Fig. 3—28), irregular horizontals etc. (Fig. 3—29).

Naturalistic Designs

Some of these designs show close affinity to the patterns on the central Indian chalcolithic pottery. Though no complete picture could be made out from the available fragments, it is fairly certain that quite many of them represented animals and birds.

(*i*) Stylized presentations of human figures [13] with loose bunch of wavy hair and solid cone-shaped body, similar to that of Navdatoli. (Pl. VII—14).

(*ii*) Stylized horned animals (Pl. VI—12, 16).

(*iii*) Birds, (Pl. VII—13, 15, 18), snakes or leeches, (Pl. VII—19, 20; Fig. 3—27, 31), creeping insects (Pl. VI—2 and Pl. VII—16), fish (Pl. I—10) etc.

(*iv*) Feather motifs (?) incomplete (Pl. VII—6, 7; Fig. 3—26, 27, 30, 34).

(*v*) Miscellaneous : Triśūla (Pl. VII—12).

Types

Typologically this pottery has nothing new. All the lower Neolithic types of the region are invariably present. Even the decoration, such as applique (finger-press) bands remain the same, (Pl VI-7, 11 ; Pl. VII—1, 3, 5). The difference is therefore mainly in the ware and surface paintings in black. Main types are :

(1) Hemispherical bowls (Fig. 2—6, 8, 10; Fig. 3—16, 20).

(2) Convex sided rimless bowl (Fig. 2—5, 7, 9, 12 : fig. 3-18, 19, 23, 25). Variants (Fig. 2—1, 3) may have a stand also.

(3) Sub-ovaloid or goblet bowls (Fig. 2—2, 4, 6, 14 ; Fig. 3—24).

Instances are also there where the rim tops are either blunted or flattened. The most notable among the pottery types is the channeled bowl,

Fig. 2. Painted Pottery from Explorations in Cuddapah and Kurnool 2. 5, 6, 9, 11—13 *from Patapadu*; 1, 3, 7, 10 *from Singanapalle*; 4, 14 *from Kanyathirtham* (1/4).

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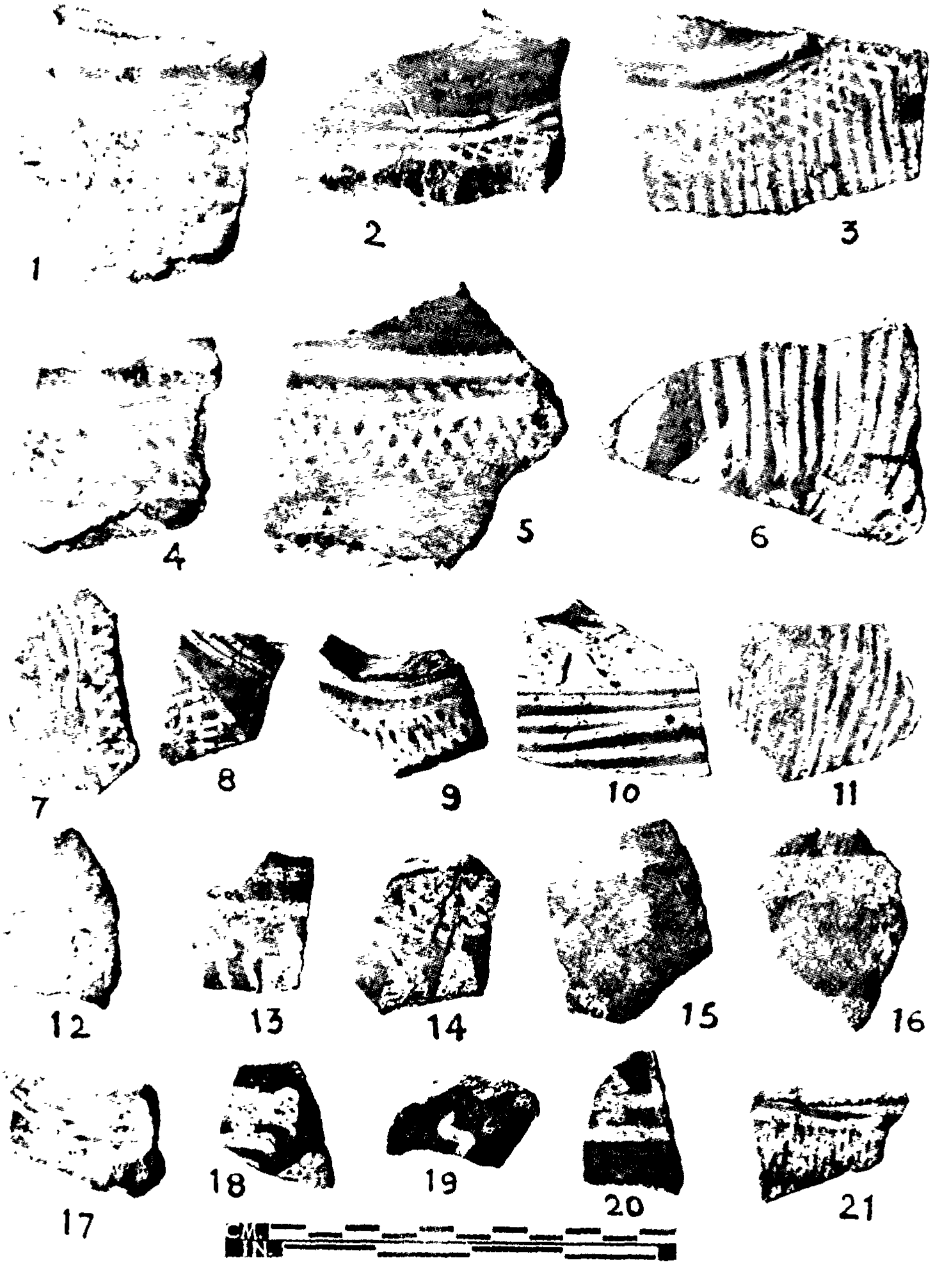
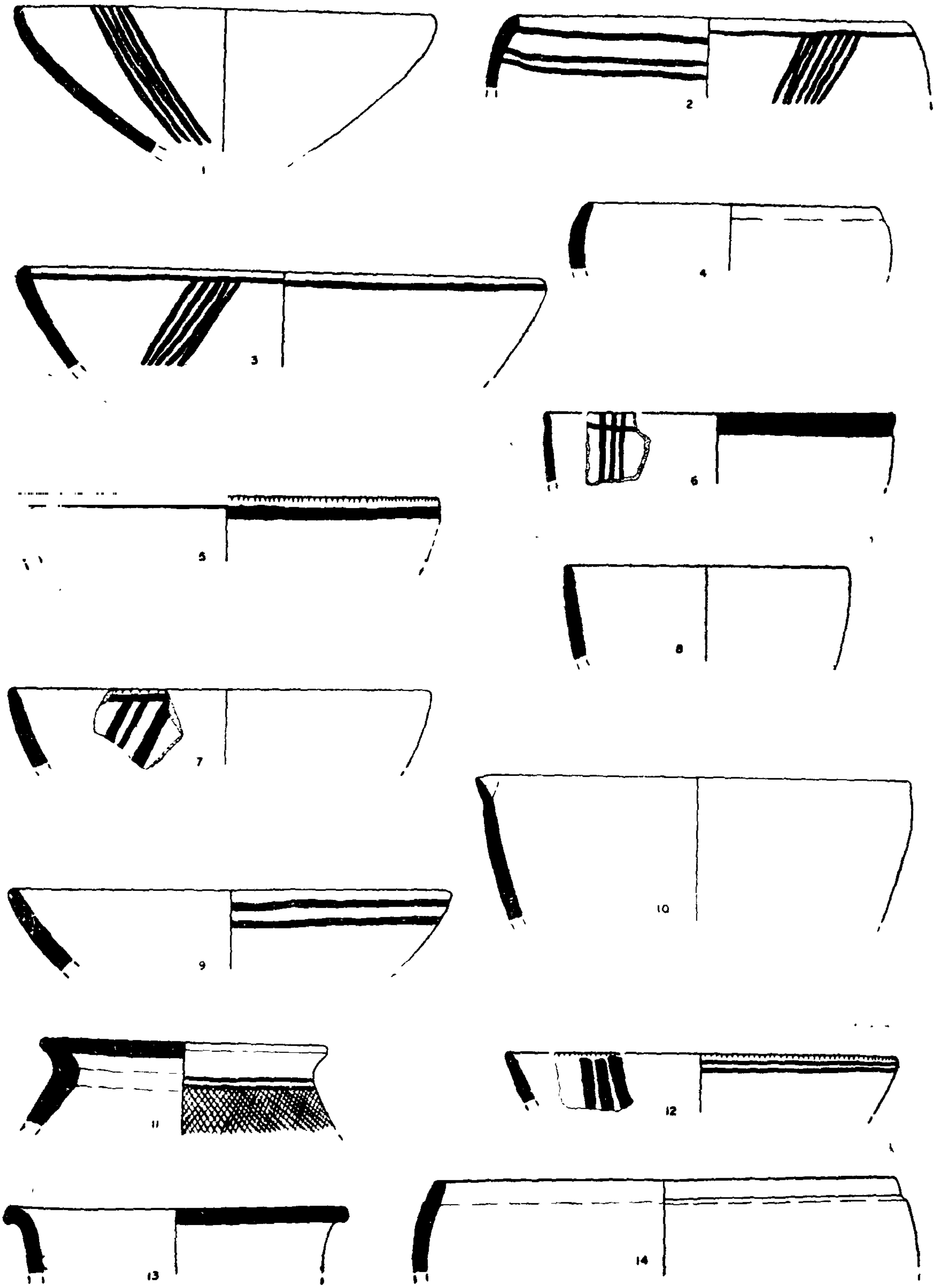


Painted pottery from explorations : design fragments. 2—Kayathirtham; 7-8 and 11 from Ramapuram; 20—Sivavaram: rest from Singanapalle.

PLATE VIII

Stone tools etc. 1-4 and 9 from Patapadu; 5-7 from Sivavaram; 8—Lanjapoluru; last row—steatite discular beads from Ramapuram.



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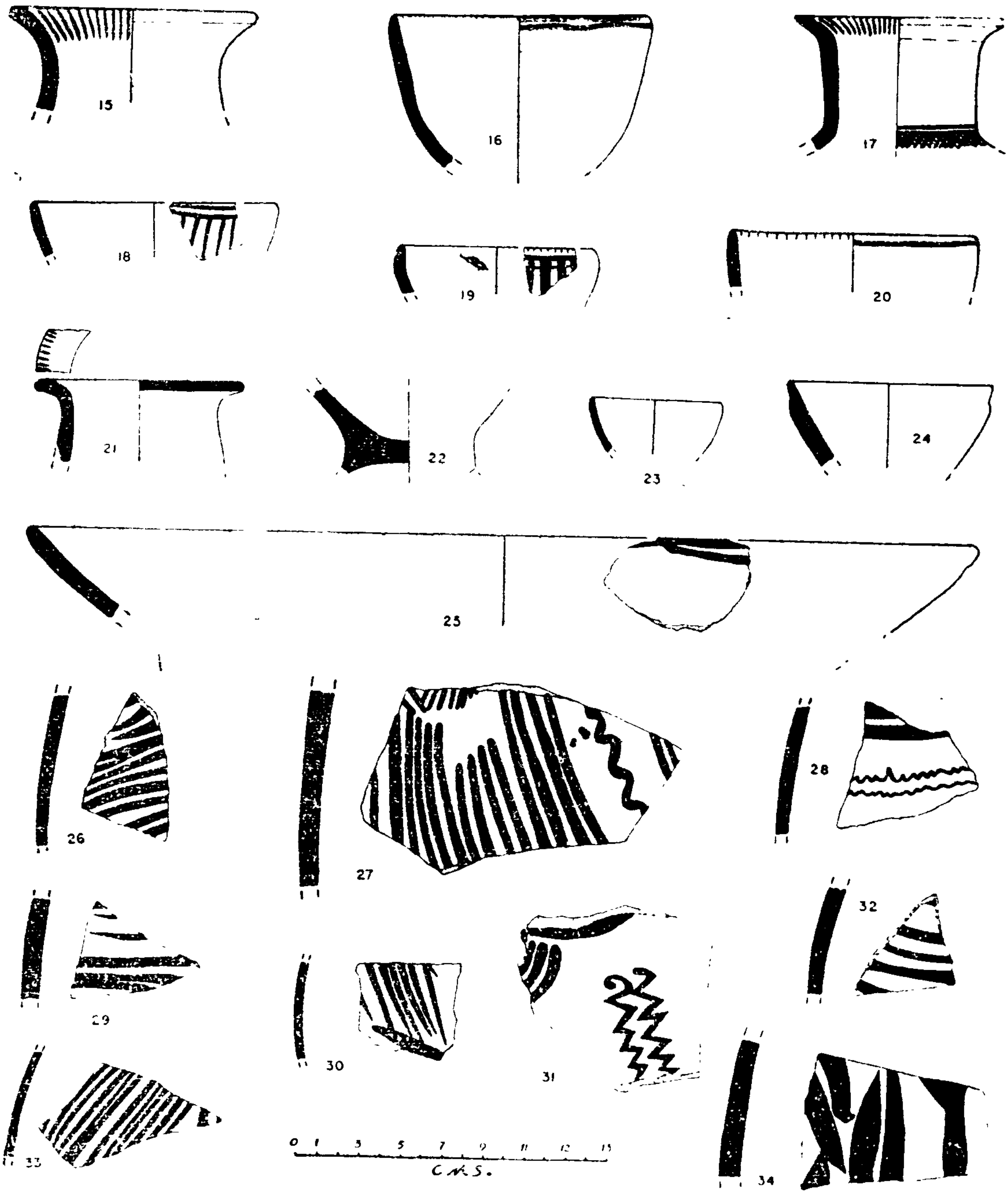


Fig. 3. Painted Pottery from Explorations : 16, 25—30 and 32—34 from Patapadu, Bruce Foote's Collections; Madras Govt. Museum; 17, 19, 21 Author's Collections from Patapadu; 22, 24 and 31 from Kanyathirtham; 15 and 23 from Singanapalle; 18 and 20 from Sivavaram. (1/5).

(Fig. 1) so characteristic of the site that it deserved to be named along with the entire range of pottery as 'Patapadu ware'. Several variants of this form with profusely painted surfaces were encountered (Pl. VI—2, 6, 8, 9, 10 and 15), not only from Patapadu but from a series of sites in this region. Allchin's specimens differ from Navdatoli as " the style of the painting of the Patapadu bowl (Fig. 1) is still without analogues [14]." The fact is that this type [15] is originally found in plain wares from the lower Neolithic levels of Andhra-Karnataka and as this region proved to be the main source it is in the fitness of things that we come across several variants with different painted designs. It may also be noted that the entire painted ware as such is not an isolated development and the author's intensive explorations in Cuddapah and Kurnool districts yielded similar chalcolithic sites containing the very same painted pottery. Among the pots, the globular vessel with constricted neck (Fig. 2—11 and Pl. VI—1,7), vessel with flared mouth(Fig.3—15,21; Pl. VI—5,11), pots with narrow straight neck and bulging globular body (Fig. 2-13; Fig. 3-17 and Pl. VI—4) are the most common. In some smaller vases the thin rim is spacious and outcurved (Fig. 3—15, 21), over which series of thin vertical lines resembling the palm leaf pattern are drawn. These are the finest examples, well finished and fired with bright red slip. They can be compared pot by pot to the so called 'Malwa' ware vases of Navdatoli, Nagda and Chandoli. The fragments of tiny cups (Fig. 3—19, 23 and Pl. VII—16, 18, 19, 20) with fine finish and paintings are similar to the stemmed wine cups of Navdatoli but no stem in any case is found. However, a stand of a bowl from Kanyathirtham (Fig. 3—22) and a small loop-handle fragment, of perhaps a cup or bowl, with black bands from Singanapalle (Pl. VI—17), are noteworthy examples.

(ii) Plain Red Ware with Crude Red Slip

This ware stands separated from the black-on-red ware only due to the lack of paintings on its surface. Apart from that, a few other factors favoured a distinction. The potting in general is distinctly poor. The surfaces are not carefully smoothened and rarely the dull red slip is seen, that too peeled off in flakes. The types usually are bowls similar to the painted ones. Large and medium size vases and jars are also in plenty and the base portions contained soot patches.

(iii) Coarse Brown and Crude Black-and-Red Wares

This ware has varied core colours occasionally bringing out blotchy pot surfaces. It has a very coarse fabric, ill burnt and hand made. The main type is represented by vases with thick out-going rim and wide-mouthed pantis with flaring rim. Crude Black-and-Red ware is also present in small quantities. Undoubtedly these sherds indicate the technique of inverted firing by the irregular black tops and totally black interiors. Whether these fragments (a few in number from several excavated Chalcolithic/Neolithic sites as well) indicate the knowledge of the potter of this method and resultant effect or they are just freaks—cannot be presently determined.

(iv) Megalithic Black-and-Red ware

This mound has also yielded a few Megalithic and early historical pottery. Bruce Foote collected several pottery fragments and iron objects of this sequence. No evidence of Megalithic burials was to be seen closer or round about the site but an extensive Megalithic burial site was located one mile west of Patapadu close to the village Mirapuram.

The fragments under this group possessed the characteristic fine fabric and finish. A convex sided bowl with flat round base, and straight sided bowl with a sagger base stand as good examples.

(v) Plain Red Slipped Ware

There are two fabrics in this ware, coarse and medium. The former is represented by thick walled vases and the latter by bowls and medium size vases etc. having a bright red slipped

exterior. A thick outcurved rim fragment of a jar has lime coating on the exterior. It may well belong to the Chalcolithic sequence.

2. Stone Implements

Associated with the above pottery wares, the stone tools belonged to two known groups.

(*i*) *Microlithic tools* :—Flakes, cores and tools belonging to the two categories were found. The material used is predominantly jasper with various shades, also chert,chalcedony and quartz. Among them fluted cores (Pl. VIII—2, 4) alone numbered twenty, by virtue of which we can say that the site must have been a factory site producing fine short blades. Typologically two tool groups were found. Flake tools of purely Neolithic association, consisted of scrapers and blades. Short blade industry along with fluted cores as noted above.

Though not from this very site a crested guiding ridge blade and cores of chalcedony (PL. VIII nos. 5, 8), along with the painted pottery noted earlier. Bruce Foote also found, " a large and very interesting series of flakes and scrapers, also strike-a-lights. Pygmy flakes and small serrated and biserrated flakes deserve close attention as also does the large series of small cores of agate, chert and lydian stone numbered from 2475 to 2604. Many are objects of great beauty and colour ". All these finds pertain to Cache site, viz., the eastern mound. Not only Patapadu but also the other explored sites shown in Map-I have yielded large number of short blades and fluted cores.

(*ii*) *Neolithic tools* : A single example of a fine Neolithic celt out of diorite was obtained, (PL. VIII no. 1). It is triangular in shape with flat rectangular central cross-section and pointed butt-end and pertained to the so-called ' Eastern type '. Foote collected a similar thin celt and calls it ' childs' toy ', (no. 2364).

V. Further Explorations in Andhra : A New Painted Pottery Culture of South-East India

Leaving aside the Megalithic and later pottery from the mounds the rest of the collections, including the painted pottery, microlithic tools, Neolithic ground stone axes, etc. belonged to an earlier complex and quite significantly Chalcolithic in character. This painted pottery seems to possess close affinities to the Malwa ware group and not to the later Deccan Chalcolithic, (Nevasa-Jorwe), typologically as well as by fabric and surface treatment. The painted designs are also closer to the Malwa wares of Navdatoli, Eran and Nagda in general. The surprising fact is that neither the spouted vases of Jorwe-Nevasa group nor those characteristic carinated bowls could be seen from this collection of painted pottery which is quite representative. For that matter Patapadu is not a solitary example. More than half a dozen similar mounds have now been discovered in the Banganapalle taluq itself and a few more from Giddalur and Kurnool taluqs, as a result of the present explorations. There is no doubt in the fact that future planned explorations may still yield many more sites of a similar sequence. The author's chance visit to the historically famous ancient mounds at Chilamakuru, Peddamudiyam and Peddandluru, (also known as Kanyathirtham), all in Cuddapah district of Andhra Pradesh, also promised the existence of a similar sequence as that of Patapadu [16].

The geographical distribution of these painted pottery sites, (as shown in the Map-1), clearly presupposes a selection on the part of the Neolithic/Chalcolithic communities for their grounds of habitation. Whereas the thickly vegetated castellated hills and rocks and the surrounding fertile valleys were preferred by the lower Neolithic, these painted pottery communities seem to have no doubt continued in older habitations to some extent, but soon moved upto the plainer hills commanding cultivable tracts round their slopes and much less vegetated. Thus we do find sites like Pusalapadu, Mettupalle, (so also Brahmagiri, Sanganakallu, Tekkalakota, Hallur and Piklihal), close to the granatoid hills wherein

we get the burnished grey, pale-grey and other lower Neolithic wares along with the black painted ware, but the profusely rich painted pottery sites like Singanapalle, Sivavaram, Ramapuram and Patapadu are situated in plainer hill regions, shooting out from Erramalais. Here the lower Neolithic wares are very meagre and in some places almost absent. Of utmost significance is the occurrence of a few white or cream slipped sherds from the last mentioned sites in particular, whose significance is to be viewed along with the Navdatoli Chalcolithic phase-I, Ahar period-Ia and Ib and Gilund early sequence [17]. In this regard, the meagre evidence of more southerly T. Narsipur [18] is no less important. At Utnur within the lower Neolithic itself cream slipped grey ware sherds [19] among A-2 ware, pointed out to the earliest dating of the ware in this region. At Pusalapadu in Cumbum taluq the painted pottery is comparatively less but the steatite discular beads are too many in number promising the existence of a factory site. Indeed, the very name of the village is striking i. e. Pūsalu meaning beads, and Pāḍu meaning refuse heap or mound of antiquity. At this particular site there are indications for a sequence right from lower Neolithic to Chalcolithic and Megalithic. A similar name is prevalent at Ramapuram in Banganapalle taluq where the Chalcolithic mound is called as ' Bandipūsala chenu ' literally meaning ' a field of wheel shaped beads, (PL. VIII, last row). This site also promised a sequence starting from Neolithic to the painted pottery Chalcolithic and early historical containing the well dated Russet-coated white painted ware.

The most notable and profuse form in all these sites, as also at Patapadu, is the lipped or channeled bowl. Several variants were collected and the channeled lip is mainly of three kinds. (*i*) Short 'V' shaped lip like wick-channel at the featureless rim of the deep bowl or basin, (fig. 2, no. 10), (*ii*) Broadened short channel, (PL. VI, no. 10), (*iii*) Long channeled lips, (PL. VI, nos. 6, 8, 9) the channel being deeper with externally beaded rim feature also in some cases. (PL. VI. nos. 2, 15). The last variety is mostly present in Central Indian Chalcolithic sites.

They bear profusely painted surfaces internally and as well as externally and the designs are monotonus lines, veritcal or horizontal lines, sometimes mixed in groups and drawn interiorly terminating near the channel as in the case of the Patapadu bowl. (fig. 1). The most important factor in all these sites, may it be repeated once again, is the total absence of the later typical ' Nevasa-Jorwe ' ware, by virtue of which these sites deserved to be chronologically placed at par with the early phases of Navdatoli, Nagda, and Eran Chalcolithic periods, if not still earlier.

VI. Possible Origins of the Painted Pottery and its Northerly Spread

Here again the distribution pattern of these painted pottery sites posed certain problems. Though coarse red, red slipped and brown plainer wares are present [20] in lower Neolithic itself to a meagre extent, they never dominated the field unlike the typical pale grey, burnished grey and buff wares. Southwards and westwards of these explored sites the evidence from Paiyampalli, T. Narsipur and Tekkalakota-Hallur respectively, did not contain any analogues painted pottery from the digs but plain red ware is present in considerable numbers with all the other characteristic Neolithic traits. This shows that the painted pottery sites of Cuddapah and Kurnool emerged as a result of inter-regional development due to some external stimuli. That such a development did not take place necessarily, in every region and site uniformly, in a particular period is amply attested. It may also be that such a change did not very much cater the taste of several other Neolithic villages closeby. The paucity of this painted ware in most of the excavated Neolithic sites of Andhra-Karnataka can

be attributed to any of the above factors. In addition, there seems to be a local specialization of industries, like pottery making, beads etc., based on close availability of raw material, as a result of which a particular Neolithic village specialized in plain or painted pottery and supplied them to the others the desired variety, perhaps on barter. All these factors may have to be taken into account for a comprehensive study of the development of the Neolithic culture. However, it may be noted that there existed already a tradition of painting right from lower Neolithic, though simplest and most primitive as it may seem to be, in the form of ocherous red bands over the rims of the burnished grey ware bowls, lids, and thick jars, etc.

Besides this, at Brahmagiri [21] a wheel made (?) painted pottery and an incised ware was found in very limited quantities from the lowest levels of the stone-axe culture, designated as period-IA. At Sanganakallu also a similar painted pottery was encountered [22]. M. H. krishna in his earlier excavations at Brahmagiri [23] found an analogous painted pottery (also at Maski), and pointed out its similarity to some Indus valley pottery. Wheeler [24] readily discarded the view of Krishna but did not explain what this painted pottery is and where does it fit in within a Neolithic culture. Brahmagiri excavation is no doubt very limited and so also of Sanganakallu. But even the recently excavated [25] Sanganakallu (1965), or Hallur did not give any new data in this regard. It must be said with a caution as these digs are also of a very limited nature.

In the earliest levels of Maski period-I, mostly comprising of pits dug into the natural soil, Thapar found a painted pottery, thin in section, coarse in texture and apparently wheel made and compares it to the Brahmagiri-IA, Sanganakallu-II2 and Kallur painted examples. Further more he states "Indulging for a moment in speculation, one is tempted to feel that the painted pottery of Brahmagiri-IA equated to that of Maski-I, although not remarkably similar to Indus valley, as asserted by M. H. Krishna, may, nevertheless show vague affinities with the Harappan cultures through some unidentified stages" [26]. Of great significance is the fact that even the plain pottery at Maski-I is wheel made, though the types and wares are closer to all the above sites of Andhra-Karnataka. Thus Maski evidenced the sudden introduction of wheel from perhaps the Harappan source, as supported by long ribbon blades, the famous surface find of a cylinder seal etc. Maski Neolithic should be placed to a still early date than what is now conjectured and it would be of great interest if a C-14 date is obtained. Again the absence of Patapadu ware at the sites like Tekkalakota and Hallur, now firmly dated to 1710 B.C. and 1675 B.C. respectively would indicate the terminus *post quem* of this ware.

If so, can we safely attribute the emergence of black painted designing and the switch over to red slipped wares by a group of early Neolithians due to the Harappan contact [27] ? There is no other higher contemporaneous culture existing during this stage of southern Neolithic [28].

VII. Contact and Correlations

We have seen that the types like the spouted vases and bowls, channeled bowls, vases with flaring mouth, deep convex bowls etc. in dull grey, burnished grey, and coarse brown and red wares occur right from the lower Neolithic of Andhra-Karnataka. All these plainer types are typically represented in these explored sites under review and significantly enough both are hand made. Thus there is a basic unity in this painted pottery group with the elderly, precedent lower Neolithic of the same region. But when these types, found to dominate in a different and distant [29] region as that of central India or

Malwa, (that too made on wheel), it really arouses great interest. For example the spouted vases in the Malwa fabric at Daimabad phase-II, Chandoli, and at Navdatoli [30] are exactly similar to the ones found at Tekkalakota-I, Hallur etc. but not to the advanced Nevasa-Jorwe variety. All these sites come under one chronological bracket, i.e. 1500-1700 B.C. At the type sites of Nevasa-Jorwe the spouted vase or bowl becomes very much sophisticated with highly carinated body, funnel mouth and long spout and of superior fabric made on a fast wheel. This development took place by about 1300 B.C. if not later [31].

Similar is the case with the channeled bowls. We may not be wrong if we think of a possible origin of the so called ' Malwa ' ware somewhere within the lower Neolithic sequence of Kurnool and Cuddapah sites itself. If such be the case then how to account for the conspicuous absence of the characteristic Central Indian painted pottery types like the goblet bowls with high ring base, the distinctive stemmed cups, the finely executed geometrical and naturalistic (animals), patterns and the rows of highly stylized human figures indicating group dancing [32] etc.

These specialized types were already present in the Harappan sites like Lothal and Rangpur [33] in Saurashtra along with Black-and-Red ware. These shapes could have very well reached the Central Indian sites and we should not forget the proximity of Rajasthan and Malwa to these Harappan sites [34] of Gujarat. Further evidence is forthcoming to show that the decadent Harapan culture itself formed the substratum of these chalcolithic village communities [35], particularly in closer regions like Banas and Malwa which were also subjected to the influence of a contemporary Neolithic culture of Central India, viz., Banda district [36] in U.P. As a result the typical and so named ' Malwa ' ware culture sites grew up not only in Central India but also in Andhra-Karnataka.

To have a clear picture of the view points put forth in the preceding paras, two excavated sites are of importance. Firstly, the Chalcolithic Chandoli on the right bank of the Ghod [37], a tributary of Bhima and other related sites. Here we get the earlier southern Neolithic culture traits as revealed by the hand made burnished grey ware, typified urns, ground stone axes, burial complexes etc. The Black-and-Red ware at Chandoli is plain but as its painted counterpart at Ahar-Navdatoli it is not associated with any burial complex. A point of interest is that this ware is absent at both Nevasa and Jorwe. Malwa ware is more abundant in layer-2 than in layer-1 along with Nevasa-Jorwe ware. The range of shapes shows that it was a de-luxe ware when compared to the others and all the types of Navdatoli were present. In addition, types like the lids with knobbed hold, the legged bowl, similar to footed bowl in buff ware at Piklihal, tubular spouted pots, etc. have their origin in the Neolithic of Andhra-Karnataka in plainer wares. The cream slipped ware comes from layer-2 and is inferior in fabric and form to Navdatoli. We have instead of nice cups and bowls of Navdatoli, globular pots of coarser fabric—a type available in the Patapadu group of sites, specially Sivavaram and Singanapalle. The lustrous red ware of Rangpur, the Rosdi ware, orange slipped ware etc. are some of the late Harappan and derivative wares influencing southward into Chandoli and like-sites. Thus an admirable assortment of various pottery industries and their movement has been revealed by this unique site which no doubt provided an exhaustive list of ' available trains ', but not the most sought for ' time table '. However, it could be clearly seen that Chandoli around 1500 B.C., has the Neolithic grey, the painted wares of the Chalcolithic possibly coming from the nearer sites of Cuddapah and Kurnool at a period when the typical or fossil Nevasa-Jorwe ware had come into vogue but somewhat earlier than the much talked of type—sites themselves. So also the northerly Prakash [38].

The site of Daimabad on Pravara [39], a tributary of Godavari river gave this 'time table' which is unfortunately unpublished. Here in phase-I of the chalcolithic, we have the thick coarse grey ware together with a white slipped ware possessing a strong affinity with the lower Neolithic as well as the Banas culture. The so-called 'Malwa' ware with channeled bowls may have belonged to the closer Andhra sites noted above and not necessarily to the Malwa region. Blunt carinated bowls of Rangpur—IIC occured in phase-II, whereas in phase-III typical Jorwe ware appeared. Daimabad is thus a crucial site worth detailed study wherein one can account for the spread of lower Neolithic towards north the typical painted pottery of Andhra to the west and the emergence of the evolved Nevasa-Jorwe ware out of the contacts with Banas and sites like Rangpur, in a chronological succession. It is precisely this painted pottery culture of South-East India, (which had its roots in the lower Neolithic), that has spread towards Deccan first, and perhaps towards Central India also. It may be pointed out here that at Navdatoli and farther above Eran the channeled bowl types occur only in the later phases of the Chalcolithic culture. At Navdatoli [40] itself they begin to appear in phase-III, (1616±130 B.C.), by the time the Jorwe ware also started. At Eran [41] the channeled bowl is found in the upper levels only dated to 1340 B.C. No Jorwe ware is found at this site. At Nagda [42] neither the Jorwe ware nor the Channeled bowl was present in the Chalcolithic period. Hence it may be concluded that the typical 'Malwa' ware did not contain the channeled bowl or the Nevasa-Jorwe ware and that the source for the Central Indian Chalcolithic wares is not in the Malwa region, as named upon [43]. Could it then be that both the Malwa and South-eastern Andhra-Karnataka regions got this pottery from a third source which may be chronologically much earlier? This question becomes all the more relevant due to the extremely rich painted pottery sites discovered far south of Krishna river.

At any rate one thing is certain. The painted pottery sites located in a primarily Neolithic region as that of Kurnool and Cuddapah and associated with ground stone axes, short blade industry, etc. do promise the existence of a Chalcolithic stage. The archaic view that the Southern branch of the Neolithic suddenly jumps into the iron age without the intervening [44] Chalcolithic link need not be taken seriously by the scholars.

NOTES

[1] Survey of India Sheet no. 57 I/3. The village name is to be pronounced as *Patapadu*.

[2] R.B. Foote, *Indian Prehistoric and Protohistoric Antiquities, Notes on their Ages and Distribution,* (Madras) 1916, 113-119. An interesting account of the excavation conducted by Bruce Foote at Patapadu in 1884 is found in his article. Of, 'Notes on Some Recent Neolithic and Palaeolithic finds in south India'; *Journal of the Royal Asiatic Society of Bengal,* **LVI, pt. 2,** No. 3 (1887), 260.

[3] Foote, *op.cit.* (1916) Pl. 26, nos. 2605-22. Also H. D. Sankalia, 'The copper and Stone age pottery of Maheshwar-Navdatoli', *Marg* (June 1961), 34-35.

[4] *Indian Archaeology* 1959-60—*A Review*, 11 (—*IAR*).

[5] F.R. Allchin, 'Painted pottery from Patapadu, Andhra Pradesh', *Antiquity*, **XXXVI No. 143** (Sept. 1962) 221-224, fig. 1.

[6] The rich collections of the author from the same site and several other sites in Banganapalle have not yielded any painted pottery comparable to *Nevasa-Jorwe* Chalcolithic group but to some extent certainly closer to *Malwa* ware.

Dr. S. B. Deo who has very kindly examined this material is also of the firm opinion that *Nevasa-Jorwe* ware is totally absent in it.

[7] A recent study of the collections of Bruce Foote in the Madras Govt. Museum revealed that the pottery sherds bearing nos. 2605/22 onwards upto 2605/58 pertained to the famous Patapadu east *Cache* site and all of them were painted black-on-red ware sherds. Some selected shapes and design fragments are reproduced here with the kind courtesy of the Director, Madras Govt. Museum. The author is extremely grateful to Dr. S.T. Satya—Murthy, Director and to Sarvashri Devasahayam and Srinivasadesikan, Curators, for their generous help.

[8] *IAR* 1963-64 (cyclostyled copy). These explorations were conducted by the author as an official of the Archaeological Survey of India, under the general guidance of late Shri M. Venkataramayya, Superintendent, S.E. Circle of the Survey. The author is deeply beholden to him and to the Director General of Archaeology in India for their very genrous help at all the stages and in particular to the latter for kindly permitting him to publish this work outside.

[9] Foote calls this site as a *Cache*, or hiding place "due to peculiar make in which the vessels and other objects occured here, it appears to me that the only reasonable way to account for the presence of such a qunatity of what must have been a valuable property to its owners in such a limited space is to regard the find as Cache." *IPPA*. CH. XVI.

[10] I. K. Sarma, 'Painted pottery from Pusalapadu, Andhra Pradesh : And Further Explorations in Cuddapah and Kurnool districts', *India* Sept. 1967, 75-94, figs. 1-2. Pls. I-II.

[11] *Op. Cit.*, [5], 224.

[12] Of significance are some of the applied ring based bowl fragments in this ware. They could be typologically compared to types 66, 67 and 69 of Piklihal lower Neolithic A3 burnished ware. cf. F. R. Allchin, *Piklihal Excavations*, 1961, 56, Pl. 35. Similar ones but painted in black occured at the chalcolithic mounds of Singanapalle and Sivavaram in Banganapalle taluq itself. The painted base fragments of bowls from Chandoli in Malwa ware, (T. XIII and fig. 34), are very much the same. Also see the plainer ones from Maski period-I (T. 33-34) and Sanganakallu (PL. VIII. xiii).

[13] H. D. Sankalia, 'New light on the Indo-Iranian or Western Asiatic relations between 1700-1200 B.C.', *Artibus Asiae* : XXVI 3/4 1964,, 312-331. fig. 3. Also see J.S. Nigam, 'Human motifs on the Chalcolithic Black-on-Red ware', *Bharati*, 1962, 1-10. PL. I, compare nos. 1, 2, 12 & 13. Dr. Motichandra has drawn our attention in particular to the grotesque human figure of Navdatoli and compared it to similar representations on the pottery of Cemetry-H at Harappa. He states that "the figure may represent *Rudra*. If that is so the barbed spear held by him should stand for the thunderbolt held in his arm (*Vajrabaho*, *RV*, II, 33.3). His lightening shaft, *Vidyut* discharged from the sky traverses the earth. (*RV*. VII, 46.3). cf. Motichandra, 'Nidhiśringa. (Cornucopia) : A study in symbolism', *Bulletin Prince of Walse Museum*, 9, 1964-66, 20-21. It may be noted here that we have a *trisula* symbol also in the present collection. PL. II, no. 12.

[14] *Op. Cit.*, [5], 222. fig. 1-nos. 1, 2.

[15] The channeled bowl or vase is known as *Gokarna* (as it resembles the ear of a cow), and is still very much in use in Andhra-Karnataka in metal. This type is entirely different from the spouted vases and bowls, *Kamandal* or or *Kamandalu*. Functionally and typologically both differ very much. In addition the former type has an earlier chronological horizon than the latter, though both emerged from the Neolithic culture, initially in plainer wares as the evidence from various Andhra-Karnataka sites revealed. *Op. cit.* [10], 87. 30 fn. Quite significantly indeed, not a single spouted jar, vase or bowl nor those characteristic carinated bowls of Jorwe-Nevasa type were found in the painted pottery sites under review. This conspicuous absence gives an added meaning for such a typological distinction between the two. While extra-Indian comparisons paving the way for a firmer identification would be welcomed, one should not ignore to classify first and foremost the internal evidence on a sound chronological framework. Sites like Patapadu, Pusalapadu and Singanapalle have yielded profusely painted and unpainted channeled bowls. They exhibit an evolution from the preceding lower Neolithic of the region itself and certainly earlier to the Malwa ware sites. Some scholars are still prone to think of the West-Asiatic origin. (cf. *Indian Prehistory*—1964, 162-163; 169-173). The Iranian parallels are several centuries later to our southern Neolithic examples. (cf. R. E. M. Wheeler, '*Civilizations of Indus Valley and Beyond*', 1966, 91-92). Even if we consider these distinct types as imports into the Indian *Neolithic*, why should we seek the source from West alone ? Dr. Subba Rao has rightly cautioned us that "we have not adequately looked for the eastern influences which our anthropologists and linguists point out". (cf. B. Subba Rao, 'Asia and India : etc.' *J.M.S.U.* (Baroda) 1962, *XI. no.* 1, 10-13). In this context the Neolithic culture of Phillippines and Formosa is exremely relevant. Subba Rao says that the Harappan dish-on-stand has no satisfactory source in Western Asia. The Neolithic culture of Huangho and Sinkiang have a grey ware dish-on-stand of the Harappan type with hallow stem as well as the corrugated one. This becomes very significant when viewed with the anthropological data of Mangoloid elements in the skeletal remains of Mohenjodaro and Harappa.

In the light of the discovery of so many painted pottery sites in the south-eastern Andhra (though not quite closer to the coast), an early cutlure contact from the South-East Asian Neolithic sites cannot be ruled out. This presupposes a linkage with the Islands of the Indian ocean during 1700-2000 B.C.

[16] Bruce Foote's collections in Madras Museum contained a few sherds of the same painted pottery from *Tadpatri* also. This shows the extent of the ware still southwards. Recently Shri B. Raja Rao of the South-Eastern circle of the Survey, found a site named *Rupanagudi* near Koilkuntla taluq of Kurnool district, which has again yielded large quantities of painted pottery. cf. *IAR* 1964-65, 6 (cyclostyled copy).

[17] H. D. Sankalia, *Prehistory and Protohistory in India and Pakistan* (Bombay) 1962, 196. These cream slipped sherds were represented as at Chandoli by fragments of high necked pots with encircling horizontal bands and globular pots etc. and not of that fine make as at Navadatoli. Also see, S. B. Deo and Z. D. Ansari, *Chalcolithic Chandoli*, 1965, 53. T. XXIII and T. XXIV. fig. 37.

[18] *IAR* 1961-62, 35-36.

[19] F. R. Allchin, *Utnur Excavations* 1961, 23 and 35.. C-14 dating for the lower Neolithic is 4250-115, T. F. cf. *Current Science*, 33, *no.* 9, May 1964, 219-292.

[20] For that matter the coarse red and brown wares were present at Sanganakallu (cf. B. Subba Raoo, *Stone Age Cultures of Bellary* 1948, 10), at Maski a pinkish dull red ware (cf. *Ancient India*, no 13, 40-47), and at Nagarjunakonda pale red ware in Lower Neolithic itself (cf. *Ancient India*, no. 14, 105). A coarse brown ware and thick gritty red ware was abundantly found at Paiyampalli in district North-Arcot (Madras), and Hallur district Dharwar (Mysore), from an early Neolithic levels wherein blade industry was also found. That this ware has become more prominent in the upper Neolithic as witnessed at Tekkla-kota-II and at Chandoli. (cf. Deo and Ansari, *Ivid*, 52, 103, 104), and developed paintings.

[21] R. E. M. Wheeler, 'Brahmagiri and Chandravalli 1947 : Megalithic and other cultures in Mysore state', *Ancient India No.* 4, 1947-48, 180-310. These sherds seem to be turn table made. Allchin says that this black-painted ware with designs applied over a red or brown ochre dressing of the burnished A-3 ware was also found at Brahmagiri-IA, Sanganakallu-II-1, and Maski pits in the very lowest levels. The prefiring black purple painted designs such as horizontal bands, cross-hatched triangles, etc. over the shoulder fragments of necked jars (similar to Patapadu), in A-3 ware of Piklihal lower Neolithic seem to indicate the origin of this painted ware.

[22] S. Subba Rao, *Stone Age Cultures of Bellary*, (Poona) 1948.

[23] *Mysore Archaeological Department. Annual Report for* 1940. (1941) and *ibid.* 1942 (Mysore) 1943, 1000f. For the account of the excavations conducted at Maski in 1935-37 see *Annual Report of the Archaeological Department, H. E. H. The Nizam's Dominions* 1935-36 and 1936-37, (Calcutta) 1939, 19-31 and 14-16.

[24] *Ancient India no.*4, ibid, 222n.

[25] H. D. Sankalia, 'Stone Age hill dwellers of South-India' *Indica, I no.* 2 Sept 1964, 129-140 and M. S. Nagaraja Rao, 'A New evidence for Neolithic life in India : Excavations in the Southern Deccan' *Archaeology* 20 *no.* 1. Jan 1967, 28-35. From the recent evidences we can say that the Neolithic habitations in Karnataka which started round about 1700 B.C. remained in the same cultural level without any drastic change until the introduction of iron in 1000 B.C.

[26] B. K. Thapar, 'Maski-1954' *Ancient India No.* 13, 1957, 24,38. fig. 9. Dr. S. B. Deo says that this radical change of profusely painting the pot surfaces and the high preference for red slipped wares, (technologically speaking), despite the fact that the types remaining the same, would mean certainly a very firm external stimulus that changed the fashions even in such daily needed pottery utensils.

[27] M. S. Nagaraja Rao and K. C. Malhotra, *Stone Age Hill dwellers of Tekkalakota* (Poona) 1965, 75-76. PL. X. The occurence of highly sophisticated copper objects from the earliest levels of Tekkalakota (phase-I 1675 B.C.), and slightly later in Hallur Neolithic phase-II postulates an established contact with the decadent Harappan or early stages of metal age Ahar culture group of sites. This contact may have been either in the form of obtaining the finished tools as such of a local manufacture by the Harappan or Aharian experts, who sought a rich source for this metal, (along with metal), in Andhra-Karnataka. Further the gold ornaments from the lowest levels of TKT-I, go to proove such a thesis. Allchin postulates the local extraction of metal on a small scale on the surface during the Neolithic period on the evidence of the settlements clustered around Maski, Hutti and Kolar gold fields. A large number of huge crushing and rubbing stones were found by Munn. (cf. F. R. Allchin, 'Upon the Antiquity and Methods of Gold Mining in Ancient India', *Journal of the Economic and Social History of the Orient* 1962, *V. part.* 2, 195-211). In the Bellary district itself gold working is evidenced in the hills near Chitageri south Bellary. Gold coils preferably ornaments were found in phase-III of Daimabad Chalcolithic, (*IAR*1958-59,18), which is undoubtedly later to Tekkalakota. However at Eran (*IAR* 1961-62, 25. PL. XLB), within the Chalcolithic period-I, a signet ring and a thin gold piece were obtained. We cannot be certain as to its earlier date to Tekkalakota examples. So also the steatite beads occuring at TKT-I and other sites starting from late levels of lower Neolithic and Allchin has correctly pointed out to their source from Harappan cultures. (cf. *Piklihal Excavations* 1961, 111). S. R. Rao on the basis of the gold ornaments

obtained from Lothal, a Harappan site in Saurashtra, informs that the analysis of the gold pendants revealed a high percentage of silver and the absence of copper and lead and points out that the gold came from the mines of Hutti and Kolar in South-India. Raw steatite required by the lapidaries and seal engravers at Lothal may have come from Southern Neolithic sites. Such contacts may have resulted in bringing the painted tradition on the vases and sites having steatite bead factories like Pusalapadu and Ramapuram. The author is grateful to Shri S. R. Rao for this information.

[28] The earlier views of B. B. Lal (*Ancient India*, No. 9, P. 102, 2n), and Subba Rao (*Personality of India* 1958, 35), about the possible advent of this painted ware from north as stray intrusions no more holds good in the light of the present discoveries.

[29] Even the plainer Neolithic wares such as coarse grey, thick burnished grey with occasionally post-firing red ochrous paint on the rims, mouth etc. are reported from the earliest phases of the Western and Central Indian Chalcolithic starting from Daimabad, Bahal, Prakash to Navdatoli, Nagda, Eran, Gilund etc. and upto Rangpur in Saurashtra. This shows that either the Neolithic of South reached northwards as a substratum of these chalcolithic cultures or a closely similar Neolithic culture should have been existing in the foot hills of Vindhyas as also supposed by Dr. Subba Rao. (Asia and India, 7).

[30] Spouted vases were found at Navdatoli from Phase-III of the chalcolithic period, from the renewed digs. Information kindly supplied by Dr. S. B. Deo.

[31] Yet Dr. Sankalia says that the 'Jorwe-Nevasa' culture gave "its highly individualistic pottery to the southern brothers, which had given in turn the burial practices, ground stone axes etc." It is becoming abundantly clear that the so termed 'Jorwe-Nevasa' culture is nothing but a regional evolution from the very southern Neolithic, confined to the Maharashtra region. That this typical Jorwe-Nevasa ware did not reach farther south is again of interest. cf. H. D. Sankalia, 'Cultural Divisions of India' *Science Today*. Aug. 67, 13 and 16.

[32] But even here we cannot forget the striking similarity between the 13 dancing figurines with linked hands from Tekkalakota and those on the Navdatoli potsherds. (cf. Nagaraja Rao and Malhotra, *Op. cit.* 1965, 84, 98. fig. 31a compare '*Excavations at Navdatoli*' 1953 fig. 42). And again the terracotta bulls (also blade industry), of the lower Neolithic having a close affinity with the terracotta bulls of Nagda (*IAR* 1955-56, 12-19), and to some of the earliest rock bruised ones from Piklihal (cf. *Piklihal Excavations*, 84), would all go to prove that the origin of these designs lies within the Neolithic sites. Instead Dr. Sankalia attempted to compare with the west-Asiatic painted dancers. (cf. *Antiquity*, *XXIX* 1955, 30. fig. 2).

[33] It has been convincingly demonstrated by S. R. Rao at Rangpur how the pedestalled bowls (or wine cups), are evolved from the Harappan bowls and dishes-on-stand in three stages. (*Ancient India No.* 18-19, 63. fig. 17). At Ahar too the intermediate stages of the large bowls with stand have been found. It is therefore not necessary, as Rao points out (*Indian Prehistory*—1964, 171), to look to any foreign influence to understand the emergence of the wine cup. Similarly, the spouted vases and channeled bowls, as pointed out earlier have certainly emerged out of the Neolithic cultures firstly in plainer wares and subsequently in painted black-on-red wares also.

[34] Wheeler even tried to show how the 'Saurashtrian Indus' itself has "less affinity to Indus fashions than to some of those of the Central Indian chalcolithic (Malwa and Narmada region)". He further states that "there is an inter-regional linkage between Saurashtrian Indus and Central India" and brings forth the long chert blades of Maski, the flat copper axes of Navdatoli and Jorwe and the availability of rice in Lothal phase—A (1700 B.C.), and at Navdatoli phases—II and III of the chalcolithic. Finally he points out the Black-and-Red ware of Saurashtrian Indus variegated by the inverted firing coming into central Indian chalcolithic through Ahar-Gilund sites. cf. Wheeler, *Op. cit.* 1966, 87-90.

[35] H. D. Sankalia, 'Archaeology in India during 1965' *Indica, Vol.* 3 *no.* 2 Sept. 1966, 91. At the chalcolithic site of Kayatha, Ujjain district Shri Wakankar obtained a sturdy Harappan like painted pottery below the Malwa and Ahar fabrics.

[36] *Ibid.*, Ground stone axes have again been found in the chalcolithic deposits at Eran and Dr. Sankalia thinks of their possible source from Banda district of U.P.

[37] S. B. Deo and Z. D. Ansari, Ibid., 1965, 4, 17, 24-25, 47, 106, 138-142.

[38] *IAR* 1954-55, PL. XXB, P. 13.

[39] *IAR* 1958-59, 16-18. fig. 7, Pl. XXXII-A, B.

[40] H. D. Sankalia, 'Spouted vessels' *Antiquity*, *XXIX* 1955, 112-115. Also see *IAR* 1957-58, 30-33. figs. 17-18. and *IAR* 1958-59, 30-31.

[41] *IAR* 1960-61, 17-18. *IAR* 1961-62, 24-25, Pl. XLI-A and *IAR* 1962-63, 11.

[42] *IAR* 1955-56, 11-19. That shows that Nagda-I ended before phase-Ic of Ahar (1550-110 B.C.), and earlier to Navdatoli phase-III dated to 1600 B.C.

[43] Dr. Sankalia pleads that "however the quest might be left open for an independent and indigenous origin for both, though there is no doubt that the south received the chalcolithic elements in its culture from north. Cf. Sankalia, Bombay, 1962, 273.

[44] Bruce Foote held this view in 1887, quite justifiably indeed to his times. But even now some archaeologists still think so. cf. George Dales, F. 'Recent trends in the Pre and Protohistoric Archaeology of South Asia' *Proceedings of the American philosophical Society*. 110. *no.* 2, April 1966, 133.

Acknowledgements

The author is extremely grateful to Shri S. R. Rao, Superintending Archaeologist, Archaeological Survey of India, Nagpur, for his valuable suggestions and for the keen interest shown in the completion of the work. Prof. Deo has read the whole manuscript and enabled the author to improve it very much by his penetrating criticisms. The author is deeply beholden to Dr. Deo for sparing his valuable time very often.

The occompanying illustrations were drawn, arranged and photographed respectively by Sarvashri A. Basheer Khan, P. R. K. Prasad, and M. B. Limayeji, collegues of the author in the Archaeological Survey, Nagpur. The author is thankful to them for their ungrudging help. The copyright of the illustrations rests with the Archaeological Survey of India.

Miscellanea

Sankhu Buddha*

by BALRAM SRIVASTAVA

Nepal is the land where artistic experience finds its manifestations through various media and the bronze and copper are the most popular among them. Bronze or copper images in Nepal, as a matter of fact, are considered more sanctified than stone sculptures and they have certain sacradotal significance. The various *yatras* celibrated throughout in Nepal, are the most significant occasions when metal images are particularly exhibited.

But, in spite of so much popularity and religious significance of metal images, it was observed that stone sculptures represent earlier sculptural traditions than the bronze ones. Thus, Stella Kramrisch writing about the antiquity of Nepal bronzes remarks, "During the rule of Pala Dynasty (750-1150)) the eastern Indian bronze images were made in large numbers in Nalanda and Kurkihar in Bihar and being easily portable found their way to Nepal where their form at once became recast in Nepali tradition.'[1] Here it is to be noted that by 'at once' she probably means the difference of more than one century, for, as it appears from her monograph that the earliest bronze figure she refers to, belongs to ninth or the early tenth century A. D. (Viṣṇu of the Brooklyn Museum, New York and Tara of the collection of Nasli and Alice Heeramaneck, New York city). She does not refer to any metal image, even of this antiquity, still *in situ* in Nepal. But the present image of the Buddha from the village Sankhu, noticed and brought to light for the first time by the author[2], aesthetically and historically is of great significance and throws entirely a new light on the antiquity of the metal images of Nepal.

Sankhu and its Heritage

Sankhu is a small village on the bank of the river Śāli, in the Bagmati *Ancala* of the Kathmandu Valley. It was also an ancient seat of Buddhism and had in the time of Anśumāna Varman (7th century A.D.) a monastic establishment. An inscription[3] of his time, issued by the authorities of the monastery of Sankhu, has been published by Silva lêvi, which not only throws light on the antiquity of the place, but also indicates the significance of Sankhu as the seat of a powerful *sāṅghika* of a *bhikkhusaṅgha*. At present also, Sankhu represents the ancient heritage of its art of different ages and styles.

The present image is found in the corner of a subsidiary shrine in the terraced courtyard of Vajrayogini Tara temple on the Sankhu hill. This image is not in worship and has no connection with the main deity of this shrine. It is simply housed in the shrine along with the other images, which were found by the temple-priests in the locality.

Artistic features of this image

It is unfortunate that this beautiful image has been so badly preserved and has been kept in a neglected corner of a shrine. It is a life-size bronze image of Buddha having a high percen-

* I am much thankful to Dr. P. N. Pant, the Additional Secretary in the ministry of Planning, Sri R. J. Thapa, the Director of Archaeology of His Majesty's Government, the King of Nepal, who have provided me facilities for my journey to Sankhu. I was accompanied in the exploration of the Sankhu region b Dr. H. N. Jha, Head of the Deptt. of History, Trichand college, Kathmandu and Sri B. K. Rizal, a tourist guide.

tage of copper, made through the 'lost wax process'. The features of this image may be described as follows:

The Buddha is represented in *ābhaṅgasthānaka* attitude. The weight of the body is explicitly firmed on the right leg, left being slightly in the advanced position, as if ready to move. This position, as B. Rolland remarks, 'was intended to suggest to worshipper that the Buddha image was actually moving or walking towards the supplant' [5] to offer boon. Hence the right hand is characteristically in the *varada mudrā*. The hand itself rhythmically follows the curve of the body. The left hand of the deity is turned upwards to touch the drapery on the shoulders. This is an unusual mode of holding the drapery (in the other standing Buddha images of Sarnath and Mathura of the Gupta period, the drapery is held by the left hand in a lower position). The drapery covers the whole body from the shoulders to a little over the anklets, entirely diaphanous to reveal the unadorned yet majestic expanse of torso beneath it. Unlike the mesh of strings typical to the Buddhas of Mathura, the parallel folds of the *saṅghāṭī* are less conventional and conspicuous and represent faithfully the clear delineation of the features of the body, not only in the plane and the outline, but also in the details showing even the nipples on the bust and the *nābhi* on the stomach. The drapery is shown not by the incision of lines, as we find on the image of the Buddha in the Birmingham Museum, but by expressing its natural volume through mouldings. The delineation of the *trivalli* on the *grīvā* is clear.

But much of the impression is derived from the facial expression. The oval face shows fullness and the grace of the deity with the lotiform eyes, the sight being fixed on the tip of the nose (*nāsāgradṛṣṭi*). Like other Gupta images the *Urṇā* is absent, but the bump of the head is charming with the curly hair on the head. The elongation of the ears is typical to Gupta tradition.

Chronological considerations

The image is uninscribed and undated. But, in spite of the fact that the Nepalese artists had skill enough to reproduce the older artistic traditions in later periods also, this particular image, for its perfect balance between the realization of the tensionless plasticity and the delicacy of its execution, seems to be a counterpart of the Buddha stone images of the early Gupta period in India and the Lichchhavi period in Nepal.

NOTES

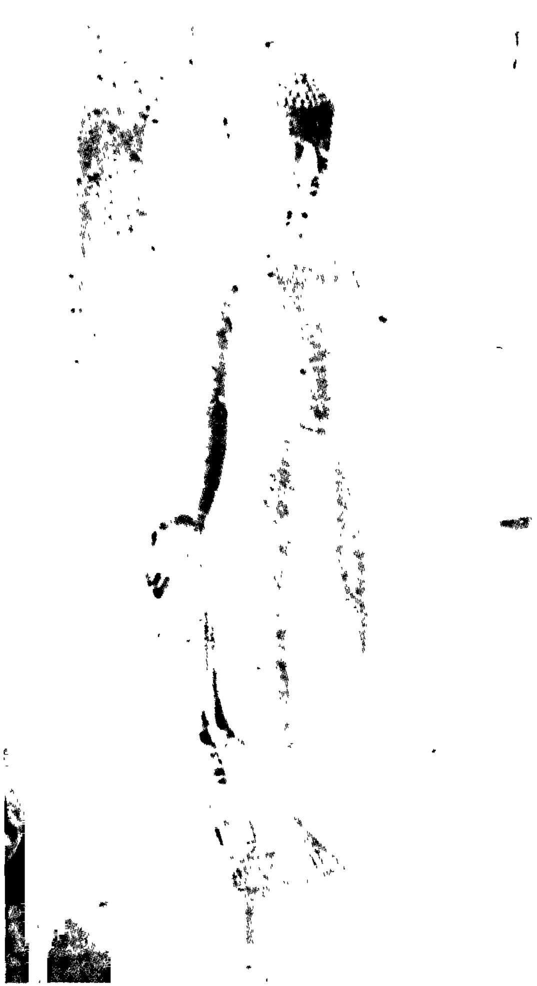
[1] *The Art of Nepal,* 40.

[2] I have shown the photographs of the image to Stella Kramrisch, Benjamin Rolland and N.R. Banerjee in the month of November 1967, when they were in Varanasi. They found the image interesting and of great antiquity.

[3] *Le Nepal,* **III**, 112.

[4] Due to certain unavoidable and unpleasant circumstances, I could not take better photographs.

[5] *The Art and Architecture of India,* 133.



A

B

Sankhu Buddha (Nepal).

A. Terracotta panel from Śrāvastı

B. Clay tablet in Lucknow Museum.

Two Early Stone Age Sites on River Son in District Bilaspur, M. P.

by NISAR AHMAD

Since the sporadic collection of stone age artifacts by a few antiquaries towards the end of the last century, the Son Valley and its tributaries have largely remained unexplored. It was only in the last decade that this region attracted the attention of prehistorians who located several stone age sites in Rewa and Sidhi districts [1]. In course of his systematic investigations of prehistoric sites, the present author discovered two Early Stone Age sites in the upper reaches of the river Son [2].

The river Son orginates in the Maikal range and flows through the Lower Gondwana formations. The river flows to the north in the western part of Bilaspur district (M.P.) and then takes a turn towards the east in Madhya Pradesh. Flowing through Uttar Pradesh and Bihar, ultimately it joins the Ganges in the Shahabad district of the last named province.

A few kilometres away from the source of this river, two Early Stone Age sites namely Nawatola and Salamtola were located in the western part of district Bilaspur. No Middle and Late Stone Age tools were present on these sites.

Nawatola 22°48′ N., 80°3′ E. [3]

This village is situated on the left bank of the Son, nearly 10 kilometres downstream from its source. Here, the cliff section at the opposite side shows from bottom upwards :

Black brown soil	...	.15 m.
Dark brown sandy silt	...	3.65 m.
Highly compact Kankars mixed with few pebbles.	...	1.52 m.

Four Early Stone Age tools were found *in situ* from the bottom layer.

Salamtota 22° 49′ N., 82° 4′ E. [4]

Downstream on the left bank of the above river is Salamtola. Here the cliff section has the same implementiferous deposits as in the Nawatola section.

Black brown soil.	...	.16 m.
Dark brown sandy silt.	...	4.57 m.
Compact Kankars mixed with few pebbles.	...	1.82 m.

Seven Early Stone Age tools were obtained from the bottom deposit.

In all, eleven tools were found from these sites *in situ*. The principal material of these tools is quartzite which is some times coarse to medium grained but occasionally fine grained as well. One artifact is made of quartz. As has been pointed out earlier, the Son flows through the Lower Gondwana formation in its upper reaches, hence it is quite likely that the material of the artifacts might have been derived from the Lower Gondwana conglomerates. These implements are of various colours such as brown, yellowish and white.

The artifacts may be classified as follows :

Tool-types	Sites		Total
	Nawatola :	Salamtola	
Chopping-tools	2	1	3
Handaxes on core	2	1	3
Flakes	...	5	5
	4	7	11

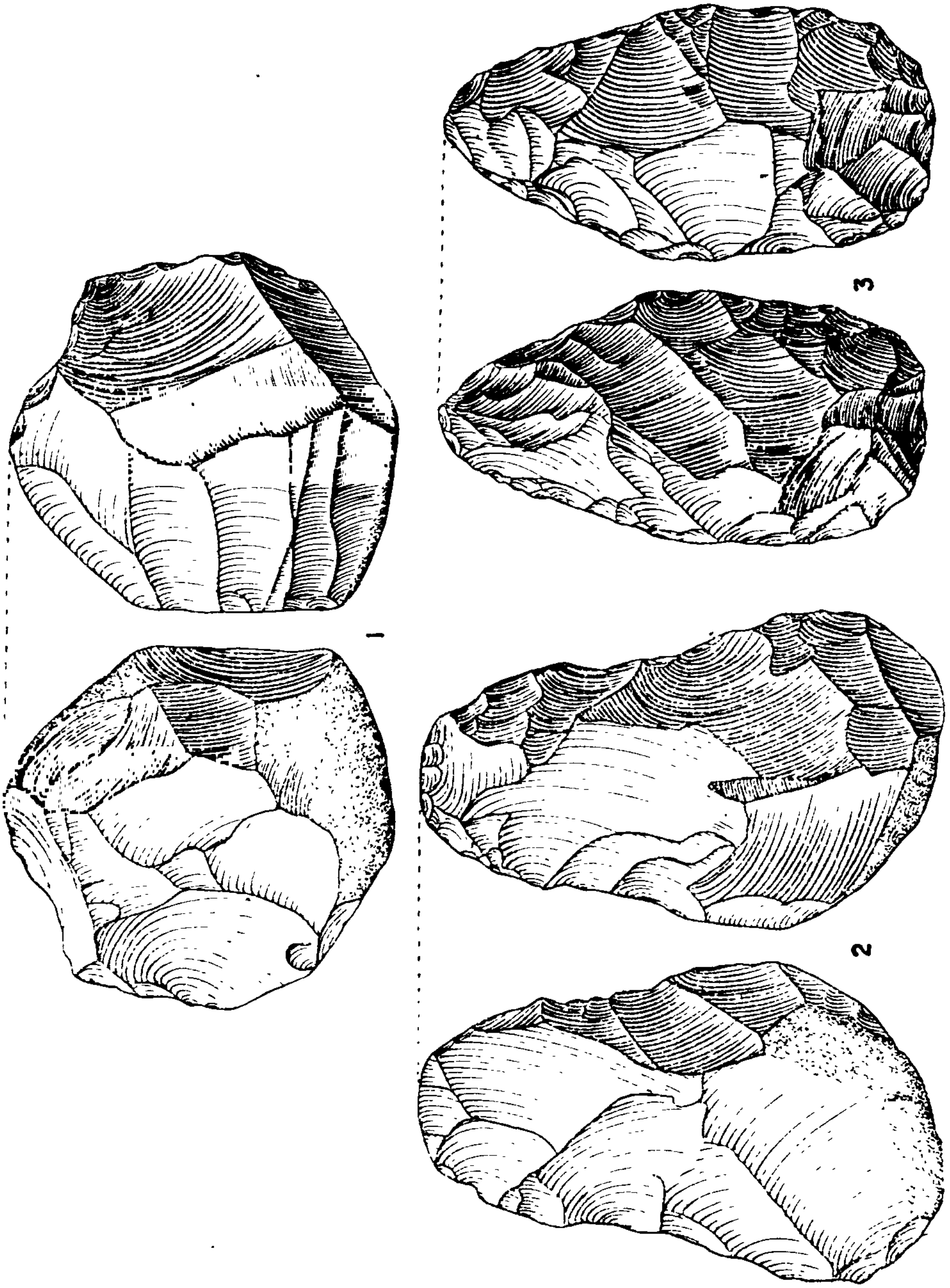


Fig. 1 (Scale 1/2)

All the chopping-tools have been flaked alternatively at one edge of the pebbles producing the wavy convex edge by the intersection of flake scars from both faces. In two of them, under surfaces have been made flat by removing several flakes. The flakes are removed from the edges. Of the three handaxes, two have big deep as well as shallow flake scars. They have also not been fully flaked and cortex is still present in both the specimens. The third one has been fully flaked showing long and shallow flake scars.

The flakes appear to have been detached by a stone hammer. Except in one case, the working is done partly on the surface of the tools, leaving the original cortex. They make a wide angle with the platform.

Chopping tool

NTA-2 [5] (Fig.1,1) : Fresh; on a round pebble of quartzite; a few shallow flake scars on the upper surface; two patches of cortex; under surface shows nine shallow and one steep flake scars; wavy edge produced by the intersection of steep flake scars from the upper surface and the flat-flaked under surface.

Size : 100 x 95 x 70 mm.

Handaxe

STA-2 [6] (Fig. 1,2) Pear shaped; made on a pebble of fine grained quartzite; upper surface shows big as well as shallow flake scars and the under-surface two deep and the rest shallow flake scars; both faces have patches of cortex; chisel like tip; thick pebble butt; sharp, slightly wavy edges; biconvex cross-section and rhomboid cross-section near the tip and the butt, respectively.

Size : 139 x 79 x 51 mm.

NTA-4-(Fig. 1,3) : Spear-shaped; fine grained quartzite; fresh; fully flaked on both faces by detaching shallow flakes by cylinder hammer technique, some stepped flake scars from the edges are also removed, producing a wavy edge running all around including the butt; biconvex cross-section.

Size : 130 x 68 x 35 mm.

Flake

STA-4 : Oval shaped small flake of quartzite; fresh; upper surface boldly flaked from the left side and partly from the right, the rest cortex; primary flake surface makes an angle of 120 degree with the platform.

Size : 82 x 62 x 30 mm.

NOTES

[1] *Indian Archaeology* 1957-58 *A Review*, 25-26; *Indian Archaeology* 1961 *A Review* and R. V. Joshi, 'Stone Age Industries of the Damoh Area, Madhya Pradesh', *Ancient India*, 17 (New Delhi), 1961, 24.

[2] Nisar Ahmad, *Stone Age Cultures of the Upper Son Valley, Madhya Pradesh*, Ph.D. Thesis; Copies in the library of the Deccan College and Poona University.

[3] 64 J/1 1 inch=1 mile map.

[4] Ibid.

[5] NTA=Nawatola.

[6] STA=Salamtola.

A Clay Tablet in Lucknow Museum: An Artistic and Religious Study

by KIRAN KUMAR THAPLYAL

A Lucknow Museum circular (about 2 cm. in diameter) terracotta sealing (S. No. 609) portrays four animals—a bull and a horse facing each other in the upper part and a lion and an elephant similarly disposed in the lower. The bull is shown stepping forward, head sideways, and the horse with its forelegs raised, as prancing. The lion is depicted in a charging attitude. The trunk of the elephant is raised. All the four are evidently full of spirit and movement. The legend in Brāhmī characters of c. 3rd or 2nd century B.C. reads :—

Yakhadāna [1] (Pl. XB).

These animals are ofcourse elsewhere represented individually or variously combined with the others on seals, ringstones, coins and in terracotta, painting and sculpture. But what is unusually striking, they are similarly grouped on the abacus of the Sarnath Lion Capital, in a terracotta plaque in the Central Museum, Lahore [2], on the moonstones from Nagarjunakonda [3] and Anuradhapura (Ceylon) [4] and on a steatite plaque from Akra [5]. Literary evidence, too, refers to these animals together, besides individual inclusions in other groups as well [6].

Different interpretations of the delineation of these animals on the abacus of the Sarnath Lion Capital have been given from time to time. It was held that they were purely ornamental [7]. They were related to certain events of prime importance in the life-story of the Buddha [8]. Contrary to expectations, it was inferred from this creation of the latitudinarian king Aśoka, that they were theriomorphic representations of Brahmanical divinities subordinated to Buddhism [9].

They are also taken to represent the four quarters of the world. The last view is supported by some substantial evidence such as the discovery of metallic images of these animals—a gold lion, silver bull, copper horse and a corroded iron mass seemingly representing an elephant—facing cardinal points, N. W. S and E. in a bronze casket sealed up in a laterite plinth of a small temple at Kedah in Malaya [10], and of bronze figures of these animals in Ceylon facing the same points [11]. They are also attached to a tank as gargoyles in the ancient Khmer capital of Angkor [12] and their images embellished the artificial Meru Parvata in Bangkok [13]. These animals are also associated with the four mouths of the Anavatapta lake [14]. Whatever be the real significance of the representation of these animals on the Sarnath Lion Capital [15], one thing at least is certain : these four were held in very high esteem since remote antiquity. They represented age-old and widespread traditions and like numerous other symbols and motifs were common heritage of various cults interpreted by them in their own way [16].

The legend on our tablet *Yakhadāna* may be translated as 'offering to the Yaksha (or Yakshas)'. The tablet (which has no string marks on the back) was quite likely a votive offering to a Yaksha shrine. The Yaksha-cult is of hoary antiquity [17]. Yaksha and Yakshī figures from the Maurya [18] and Śuṅga [19] period downwards bear ample testimony to the popularity of this cult.

The *Niddesa* mentions three of these with certain other animals and titular deities like Vāsudeva, Baladeva, Indra, Brahmā, Nāgas, Mahārājika gods etc. having their own cults [20]. The *Milindapañho* furnishes a similar list with the addition of a few others and hints at their esoteric nature [21]. The *Nāyādhammakahā* mentions some 40 devatās including the elephant, horse, lion and the cow (instead of bull) [22]. We can postulate that some people would have worshipped more than one animal.

But, as already stated, the tablet, in all probability, was a votive offering to a Yaksha shrine. In fact, this is the earlier of the only two glyptic examples so far known [23], clearly testifying the prevalence of *Yaksha* cult, though the ancient Indian literature so well demonstrated by Coomaraswamy, has copious references suggesting not only the existence of Yaksha shrines but also their commonness [24].

As regards the presence of animals on a tablet used as a votive offering to a *Yaksha* shrine, the association of these with the *Yakshas* in various forms is well known. In Bharhut some of the *Yaksha* figures have been depicted with animal *vāhanas*, Gāṅgeya [25] and Supravāsa [26] each represented with a tusker and Ajakālaka with a composite animal having the tail of the *makara* and the " front part of a quadruped " [27] perhaps of a lion or tiger [28].

The *Yaksha* and *Yakshī* figures have sometimes been conceived in therianthropic form—part human and part animal. A *Jātaka* [29] refers to a horse-faced (*aśvamukhī*) *Yakshī* and such representation in art is known [30]. We may also refer to a terracotta female figure with the face of a cow(or bull) in the Lucknow Museum which probably represents a *Gomukhī Yakshī* and a sculptural piece in the same museum (no. G385) representing a bull-faced *Yaksha* [31]. More significant in the present context is the fact that the *Aupapātra-Sūtra* and *Antagaḍa Dosāo* refer to the practice of decorating the diases of the *Yaksha* shrines with animal figures [32] which include the bull, horse and elephant—three of the four animals that occur on our tablet.

Another evidence suggesting the association of *Yakshas* with animals may also be considered. The possibility of these animals symbolising the four quarters has already been noticed. The *Niddesa* even refers to the cult of quarters [33]. The *Chatumahārājas* are the guardians of these quarters [34], and interestingly enough, the label inscriptions at Bharhut designate each of them as a *Yaksha* [35].

Our tablet is a rare example among the glyptics of the historical period whereon as many as four animals have been represented together, though such representations are known on hoary Harappan ones [36].

The depiction of four animals in such a limited space, so remarkably life-like and with a strong suggestion of rhythmic movement bears ample testimony to the great skill and high artistic attainments of its maker. The Mauryan sculptures in stone are ofcourse celebrated for their dignity and majesty, but the present tablet is a rare piece of this early period in the medium of clay, remarkable for the realism of its figures with a fine suggestion of animal vigour [37].

NOTES

[1] There is a slanting stroke after *na*. But it does not seem to be part of a letter.

[2] D.R. Sahni, *Guide to the Buddhist Ruins at Sarnath*, 5th ed., 40.

[3] V.S. Agrawala, *Chakradhvaja* (Varanasi), 1964, figs. 101-104.

[4] D. Gordine, 'Masterpieces of Oriental Art-7' *JRAS*, 1946, 123, Pls. X and XI.

[5] *Op.cit.*, [3] Fig. 93-A.

[6] For various literary and archaeological references see Agrawala, Ibid., 60-63 and 93 and see plates.

[7] *Op.cit.* [2], 40.

[8] B. Majumdar, *Guide to Sarnath*, 2nd ed., 46. The elephant is supposed to symbolise conception, bull Nativity, horse Renunciation and lion the Buddha himself. (Cf "Śākya simha"—a well-known epithet of the Buddha) whose preaching was compared with the roar of a lion.

[9] *Op.cit.* [2], 40.

[10[H.G.O. Wales, 'Recent Malayan Excavations and some wider Implications', *JRAS*, 1946, 142-149 and 145.

[11] V. A. Smith, *History of Fine Arts in India and Ceylon* 1911, 60 fn., *Op.cit.* [10], 145.

[12] B. Rowland, *Art and Architecture of India,* 258, n. 12.

[13] Ibid., 41.

[14] T. Watters, *On Yuan Chwang's Travel in India* I, 32.

[15] For further discussion see author's article 'The symbolism in Sarnath Lion Capital and its Purpose', *JUPHS (N.S.)*, **VIII**, 1960, 11-19 and Plates; Agarwala, *Op.cit.* [2], 29-40.

[16] Significant human and animal combinations in parts, e.g., Gaṇapati (man elephant), Narasimha (man lion) Nandikeśvara(man bull) Hayaśīrsha (man horse) in the later myths may well be viewed in this light.

[17] Some scholars take certain Harappan figures as proto-type of Yakshas. According to some, Yakshas have been referred to in **RV** 7, 61, 5 and their temples in **RV** 4, 3, 13. (See V.S. Agrawala, *Studies in Indian Art,* 1965, 87). It is however doubtful whether the word 'Yaksha' in **RV** stands for the Yakshas. Sāyaṇa takes it to mean *Yajna.*

[18] The figures from Parkham, Pawaya and Patna are same of the earliest found representations of Yakshas.

[19] Amongst Bharhut sculptures we find inscribed images of the Yakshas (Virūḍhaka, Ajakālaka, Gāngeya Sūchiloma and Supravāsa) and Yakshīs (Sudarśanā and Chandrā).

[20] *Niddesa,* (i), ed. by L. De la Vallee Poussin and E.J. Thomas, (London) 1916, 89, *to batthivattika ka va honti, assavattika va honti govattika va honti.*

[21] *Op. cit.* [2], 33.

[22] Ibid, 34.

[23] The other one is in the collection of Shri R.C. Tandon of Allahabad. It bears a *makara* figure and the legend which has been read by Professor K.D. Bajpai (kindly conveyed through a letter) as *Mahamdamrıtaya Yakshasya Dhanyasriyah.* The letters have been partially rubbed off.

[24] A.K. Coomaraswamy, *Yakshas,* I.

[25] B.M. Barua, *Bharhut*, I, 60, and Cunningham, *Stupa of Bharhut*, Pl. XXI, I and p. 134. The inscription reads '*Gamgito*'.

[26] *Op.cit.*, [25], 61.

[27] Ibid, 60.

[28] J.N. Banerjea, *Development of Hindu Iconography*, 2nd ed., 342.

[29] *Padakusalamanava, Jataka,* No. 432.

[30] *Op.cit.* [24] Pl. 12, **Fig. 1.**

[31] I am indebted to Shri Sankata Prasad Shukla for drawing my attetion to these two pieces in Lucknow Museum.

[32] *Op.cit.* [24], 19-20.

[33] *Niddesa, Op.cit.*, 89, *disvattika-va-honti.*

[34] Vaiśravana—north; Dhṛitarāshṭra—east; Virūḍhaka—south, and Virūpākhsa—west. vide *Dighanikaya*, III, ed. by J.E. Carpenter, (London), 1911, 197-201.

[35] *Op.cit.* [25], 59.

[36] J. Marshall, *Mohenjodaro and the Indus Civilization.* I, Pl. XII, Fig. 17; Ibid., III, Pl. CXVI, no. 14.

[37] We gratefully acknowledge the facilities extended by the Lucknow Museum authorities for study and photograph.

An Episode from Rāmayaṇa on a Terracotta Panel

by SURENDRA KUMAR SRIVASTAVA

The Archaeological Survey of India Annual Report for the year 1967-68 brought out a significant statement on the excavated materials of Sahet-Mahet. J. Ph. Vogel published some terracotta panels of the Gupta age which have been drawing attention of scholars for their exquisite beauty, rhythmic effect, technical attainment and successful depiction of mythological stories. The terracotta panel in question displays two figures, a human (male) and (Pl. x, A) a monkey. The latter has been identified by Vogel as *Hanumāna* [1]. The purpose of the present paper is to study this panel once again and to suggest a more appropriate identification.

The human figure in the panel is depicted on the left side holding a sword in his raised right hand and hair being done stylistically in deep incised lines. He also puts on bangles, *kuṇḍalas*, beaded necklace ; an *uttarīya* suspending down from the right shoulder forming a lasso round the waist and an underwear covering the loin. Just to his left stands a monkey figure clothed in an underwear, ornamented with bangles and necklace, kicking the human figure and also lifting a rock in its outstretched hands to throw on him.

Originally the heads of these figures were found detached when excavated and later on were refixed on their proper places [2]. Around the two figures, the three borders of the panel are decorated in criss-cross design executed by incised lines.

Vogel was the first scholar to study this panel in his Sahet-Mahet excavation report. He has identified the monkey with that of *Hanumāna* but says nothing for the other figure [3]. Later, C. C. Dasgupta fully agreed with the views of Vogel, as far as the monkey is concerned, and identified the other figure as *Rākshasa* [4]. M. M. Nagar is also of the same opinion and he describes the figure as Hanumāna and *Rākshasa* at war [5].

The theory of Vogel is to the effect that (i) the depicted scene is from Rāmāyana and (ii) it displays *Hanumāna* and a *Rākshasa* at war. However, certain points do not permit us to accept the later part of this theory.

The first objection is that all other panels related to the *Rāmāyaṇa*, which have been excavated from this temple, illustrate some important incidents from the epic. The panel stating the redemption scene of *Ahalyā* is an example of this fact [6]. Now the question arises as to why the modellers of this particular panel depicted a scene which was not at all connected with some story or incident, while *Rāmāyaṇa* was full of such references. Therefore, it might not be correct to assume that the panel does not represent a particular story and merely refers to an ordinary fight between *Hanumāna* and an unknown ogre.

Another objection is on account of the necklace worn by the monkey figure. There is no reference either in the *Vālmīki Rāmāyaṇa* or in the *Ādhyātma Rāmāyanṇa* to *Hanumāna* putting on a necklace while he was fighting a *Rākshasa*.

Lastly, we also do not find any reference to *Hanumāna* attacking with a rock a goblin who was ready to slaughter him *(Hanumāna)* by his sword.

From the above discussion it becomes almost clear that the depicted scene is neither an ordinary

one nor the fight is in between *Hanumāna* and an unknown *Rākshasa*. Now we come to an episode from *Rāmāyaṇa* more akin to the scene depicted in the panel.

In the *Yudha-kāṇḍa* of the *Vālmiki Rāmāyaṇa*, the younger brother of *Bālī* had a combat with *Virūpāksha*, a general of *Rāvaṇa* [7]. When all the famous warriors including *Indrajīt Kumbhakarṇa*, *Dhumrāksha* and *Akampan* etc. of *Rāvaṇa's* army were killed and a great panic was created in the battlefield, *Rāvaṇa* sent *Virūpāksha* to fight against *Sugrīva*. As soon as he came in the battlefield he jumped out of his chariot with his bow, mounted on an elephant and attacked the enemy with a hideous roar [8]. In order to control the worsening situation *Virūpāksha* also aimed at *Sugrīva*, shot arrows and made his army fearless [9]. *Sugrīva*, finding his soldiers in trouble, made a severe attack on the elephant carrying *Varūpāksha* with a tree, resulting in the elephant's retreat to a bow distance. The elephant screamed with pain and sat down [10]. Ultimately *Virūpāksha* had to get down from his wounded elephant's back with a sword and shield. He also chided *Sugrīva*, who was standing steadily [11]. When *Sugrīva* apprehended the seriousness of the situation he lifted a rock in his hands, which was as black as cloud, and tossed over *Virūpāksha* [12].

As regards the necklace of the monkey figure in the *Adhyātma-Rāmāyaṇa*, it is mentioned, when *Bālī* was born, *Indra*, his father, gave him a golden necklace and left for his heavenly abode [13]. That golden necklace was amazing and victory adducing. It was so powerful that *Bālī* never failed to put it on whenever he sought war, so much so, when he was fighting *Dundubhi* and his own brother *Sugrīva*, he did not foget to wear it [14]. Later on *Bālī* gave that necklace to *Sugrīva* when he was getting unconscious and was at the verge of collapse. He said, " *Sugrīva*, you put on this celestial necklace of *Lakshmī* before I die, otherwise its *Śrī* will disappear "[15]. On these words *Sugrīva* forgot all his previous enmity and adorned himself with that necklace [15]. In *Abhishekanāṭakam* of *Bhāsa* also we have a description that *Bālī*, at the time of his death, gave *Sugrīva* a family *hemamālā* to put on, which the latter accepted with gratitude [17]. Accordingly, the probability is that the necklace, depicted in the panel, is a representation of this necklace, which was given to *Sugrīva* by *Bālī* and which the former did not forget to put on while in combat with *Virūpāksha*.

Thus we conclude that the panel may be better identified as depicting the fight between *Sugrīva* and *Virūpāksha*. This alternative suggestion is nearer to the scene and characteristic features illustrated in the panel. The question as to whether this panel may be associated with some other apt theme also, remains open.

Notes

[1] J. Ph. Vogel, *Archaeological Survey of India Annual Report*, 1907-08, 96. Pl. XXVII.

[2] Ibid.

[3] Ibid.

[4] C. C. Dasgupta, *Origin and Evolution of Indian Clay Sculpture*, 221.

[5] M. M. Nagar, *Sravasti*, 1956.

[6] S. K. Srivastava, *Prajna*, IX (2), 1964.

[7] *Valmiki Ramayana*, Yudha Kanda, Sarg 96.

[8] Ibid.

विरूपाक्षः स्वकं नाम धन्वी विश्राव्य राक्षसः ।
रथादाप्लुत्य दुर्धर्षो गजस्कन्धमुपारुहत् ॥१४॥
स तं द्विपमथारुह्य विरूपाक्षो महाबलः ।
ननर्द भीमनिर्ह्रादं वानरानभ्यधावत ॥१५॥

Yudha Kanda, 96—14-15

[9] Ibid.

सुग्रीवे स शरान् घोरान् विससर्ज चमूमुखे ।
स्थापयामास चोद्विग्नान् राक्षसान् सम्प्रहर्षयन् ॥१६॥

Yudha Kanda, 96—16

[10] *Valmiki Ramayana*,

ततः पादपमुद्धृत्य गुरुः रामप्रधनो हरिः ।
अभिपत्य जघानास्य प्रमुखे तं महागजम् ॥
स तु प्रहाराभिहतः सुग्रीवेण महागजः ।
अपासर्पद् धनुर्मात्रं निषसाद ननाद च ॥

Yudha Kanda, 96, 18-19

[11] Ibid.,

गजात् तु मथितान् तूर्णमपक्रम्य स वीर्यवान् ।
राक्षसोऽभिमुखः शत्रुं प्रत्युद्गम्य ततः कपिम् ॥
आर्षभं चर्म खड्गं च प्रगृह्य लघुविक्रमः ।
भर्त्सयन्निव सुग्रीवमाससाद व्यवस्थितम् ॥

Yudha Kanda, 96-20-21

[12] Ibid.,

स हि तस्याभि संक्रुद्धः प्रगृह्य विपुलां शिलाम् ।
विरूपाक्षस्य चिक्षेप सुग्रीवो जलदोपमाम ॥

Yudha Kanda, 96-22

[13] *Adhyatma Ramayana*,

वाली सम्भवत्तत्र शक्रतुल्य पराक्रमः ।
तस्या दत्वा सुरेशानः स्वर्णमाला दिवंगतः ॥

Uttara Kanda, ch. 3-92.

[14] *Valmiki Ramayana*,

तमेव मुक्त्वा संक्रुद्धो मालामुत्क्षिप्य काञ्चनीम् ।
पित्रा दत्तां महेन्द्रेण युद्धाय व्यवतिष्ठत ॥

Kishkindha Kanda, 11, 39

[15] *Valmiki Ramayana*,

इमां च मालामधत्स्व दिव्यां सुग्रीव काञ्चनीम् ।
उदारा श्रीः स्थिता ह्यस्यां सम्प्रहास्यन्मृते मयि ॥

Kishkindha Kanda, 22, 16

[16] Ibid.,

तद्वालिवचनाच्छान्तः कुर्वन् युक्तमतन्द्रितः ।
जग्राह सोऽभ्यनुज्ञातो मालां तां चैव काञ्चनीम् ॥

Ibid., ch. 22-18.

[17] *Bhasa*,

वाली—सुग्रीव ! प्रतिगृह्यतामस्य-कुलधनं हेममाला ।
सुग्रीव— अनुगृहीतोऽस्मि ।

Abhishekanatakam, Bhasa Nataka Chakram, I, Pratham Anka, 21.

A Prehistoric Bronze Anthropomorph in the Patna Museum and Its Identification

by PRITHVI KUMAR AGRAWALA

In my recent visit to the Patna Museum, I got an opportunity of examining a number of the bronze antiquities in the collection of the Museum through the kind courtesy of the Curator Dr. P. L. Gupta to whom I am indebted and thankful for showing me the unique piece described below (Arch. No. 240; ht. 18 cms.; from Manbhum) and allowing the permission for its publication. It is profitable that this piece appears in the accompanying illustrations and apparently adds greatly to our knowledge of the early Gangetic Valley Bronze Hoard [1] material.

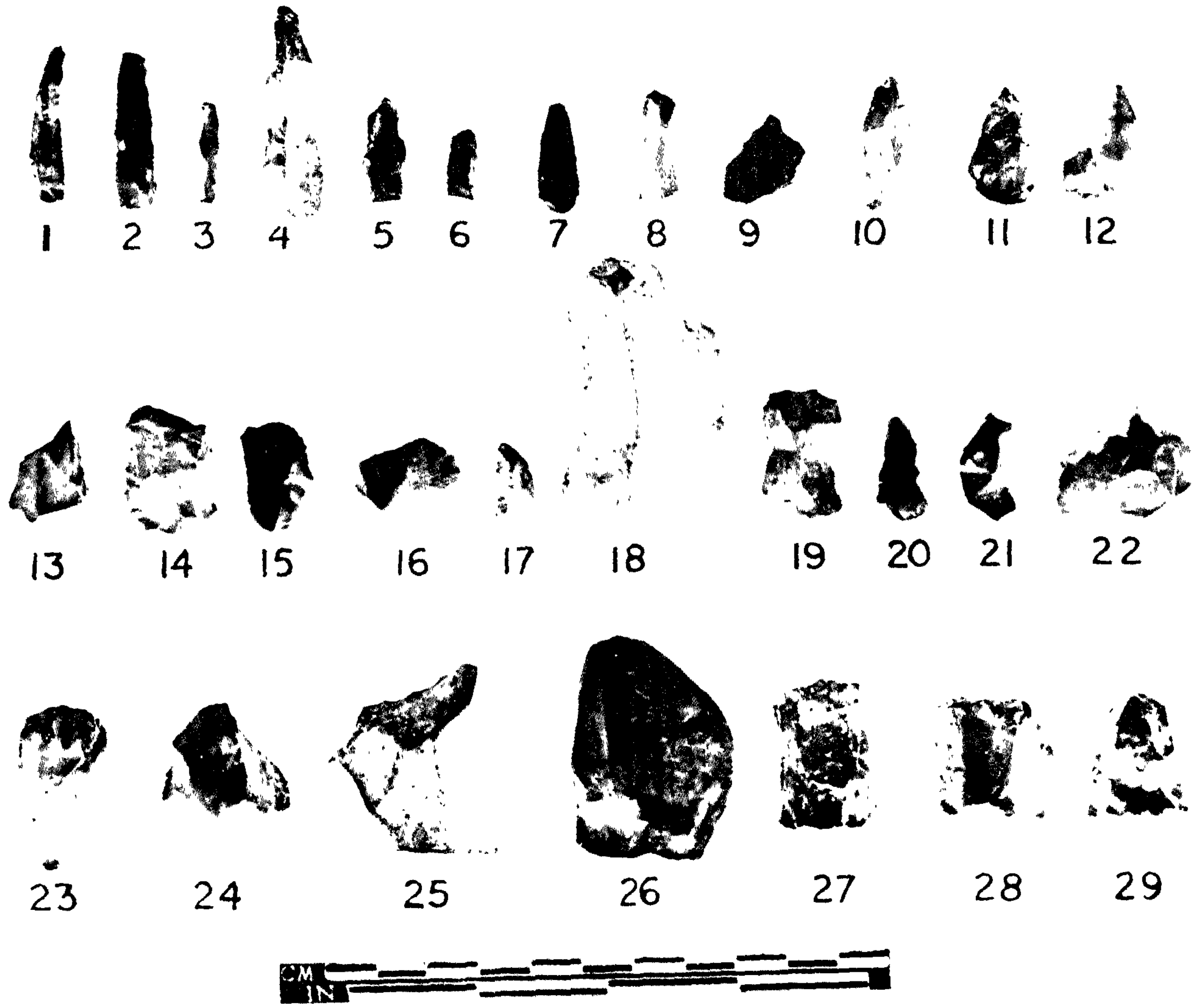
Important evidence of early metal industry in Northern India is represented by a series of Copper Hoards discovered from over thirty-six sites in the Gangetic Valley, Orissa and Madhya Pradesh ; and recently added area of Rajasthan by its important site at Khurdi. A comprehensive study of over 600 objects has revealed eight principal types, as constituting these hoards, including a form known as *Anthropomorph*. Artistically, certain barbed harpoons and the ' Anthropomorphs ' from Bisauli, Sirthauli and Sheorajpur are to be regarded ' masterpieces ' of these hoards. Indeed, the anthropomorphic shapes form a unique series themselves from the Gangetic basin. Nowherelse in the world such objects are found. They are named anthropomorphic figures only for convenience's sake as they seem to ' represent a human form with straddled legs and, incurved arms '. But their purpose whether religious or otherwise is highly doubtful. On these few problems the piece described here from the Patna Musuem Collection throws a veritable light.

From it there can be no doubt that it represents a human figure and moreover that of a male since the genital portion is clearly represented. It shows a vertical rendition of a male figure, though crudely made. Yet it is certainly of a high merit as regards ideographic representation. A comparison of this with the Sirthauli or Bisauli ' Anthropomorph ' leaves no doubt that the latter class of representations also intended human figure in a similar attitude and conception of stylisation. How these figures lead to the well known Śrīvatsa symbol of early art is summarily illustrated here. (Fig. 1, 1—4) The first and the second are the renderings of the Anthropomorphs from Bisauli and the third is the piece from Patna Museum. Next is the Śrīvatsa symbol from a Mathurā Āyāga-Paṭṭa of the Kushāṇa period.

Also for a profitable comparison, the human representations from the prehistoric and primitive paintings are shown here (Fig. 2, 1—4) (The " Ape Man ", Singhanpur ; Figure, Adamgarh ; The " Mermaid ", Singhanpur ; Figure, Son Bhadra. After Gordon).

However, the Śrīvatsa symbol known from early Indian artand in a group of Eight Auspicious symbols (*ashṭamaṅgalas*) bears striking resemblance to the anthropomorphic representations mentioned above. This may even go to suggest some cult associations for the anthropomorphic shapes, possibly representing a symbol of the

An anthropomorph from Patna Museum.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(Bihar).

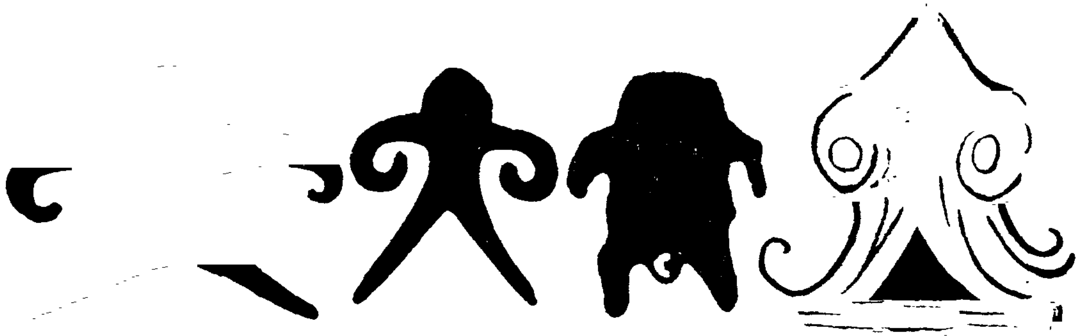

Fig. 1 (1—4)

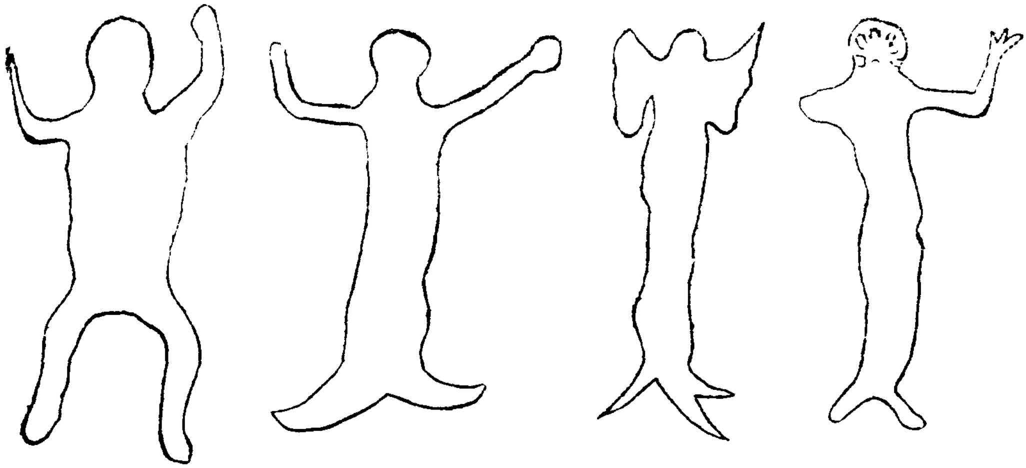

Fig. 2 (1—4)

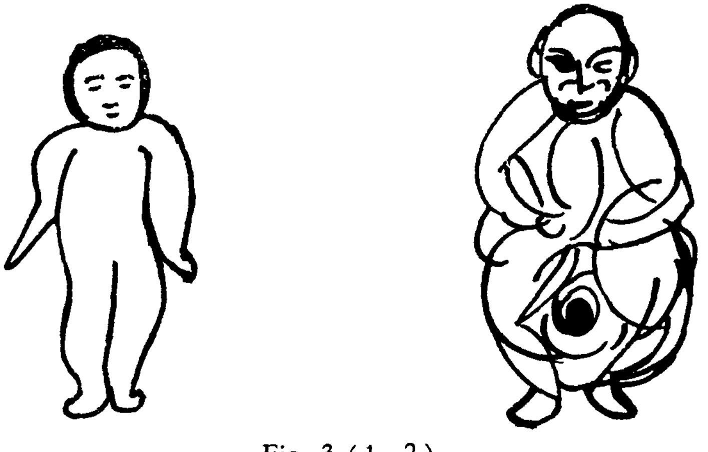

Fig. 3 (1—2)

Mother Goddess whose cult was widely popular from the earliest ages. She might have been a deity of so much importance in the culture-complexes represented by the Gangetic Copper Hoards that her symbol was in great demand just as the other associated weapons of the hoards appear to be as objects of commodity. A symbol of copper or bronze was obviously an object of value as compared to figurines and emblems of clay, etc.

If so, a comparative class of the above, appears to have been metallic or clay representations, affiliation of which can possibly be with the " Babe of the mother-goddess Śri " (Śrī-vatsa). For example, one instance in metal comes from the Piprahwa relics (Fig. 3,1) [2]. Another may be cited from Ahichchhatra terracottas (Fig. 3,2) [3].

NOTES

[1] B. B. Lal, 'Further Copper Hoards from the Gangetic Basin, etc.', *Ancient India,* 7 (New Delhi), 1951, 20-39; H. D. Sankalia, *Prehistory and Protohistory in India and Pakistan,* (Bombay), 1963, 223.

[2] V. S. Agrawala, *Indian Art,* (Varanasi), 1964, Pl. XVI.

[3] V. S. Agrawala, 'Terracotta Figurines from Ahichchhatra', *Ancient India,* (New Delhi) 1948, Pl. XXXVI, 63.

The Tribal Deity of The Vishāṇins

by DEENABANDHU PANDEY

At Mohenjo-daro, Mackay discovered a steatite seal [1] on which a three faced horned god seated in *yogic* pose and surrounded by animals was seen. There were more than one seal with the depiction of horned god out of which two came from lower and two from upper levels [2]. Marshall took the figure as depicting Paśupati and identified it with a prototype of the historic Śiva [3]. Sastri takes the figure to be a representation of a composite god being nearer to a prototype of Vedic Rudra and connects him with the Mahishāsura of the Purāṇic times [4]. According to him the figure is composed of buffalo-head, scorpion arms, tiger waist, and serpent legs. While it may be agreed upon that the figure has only one face, the head being of a buffalo is a far-fetched statement. Neither the form of the head-dress of the figure resembles the buffalo horns nor the stylization proposed by Sastri is convincing. The face is of a human, no doubt a stylised one.

On the pre-Harappan pottery we see the depiction of many animals. In those animals the representation of bovines is of more importance than others. By the time of Kulli culture and in the subsequent Harappa culture the depiction of bull assumes an important place. Whenever a bull is represented, his horns have been depicted in the front view though the bull may be seen in different views. Thus the horns were given importance. It will not be unlikely if we take the head-dress of the figure in discussion to represent an ornamented and stylized form of the horns of the sacred bull. It may also be connected with the *chandralekha* on the forehead of Śiva and his association with the *Nandin*.

Thus we may conclude that the devine figure is a composite form of bull, tiger, scorpion and snake. The form of the god well suits to be a prototype of Vedic Rudra who becomes Siva in later times. The Rudra-Śiva cult seems to be very popular in the Harappa culture [5].

The god under reference may well be identified as a tribal-deity of the Vishāṇins. Vishāṇins mentioned in the Ṛigveda [6] were one of the ten kings in the tribal confederacy against the Bharatas, lead by Viśvāmitra. The Vishāṇin tribe has been grouped by Pusalkar with the five frontier tribes which were of little note [7]. Vishāṇins were located between the rivers Krumu and Gomati. The five frontier tribes seem to be non-Aryans. The word Vishāṇin, is explained by Sāyaṇa as 'holding horns in the hand'. The word has been used in the Epic and Purāṇic literature to mean 'having horns' and 'horned' [8]. Pusalkar suggests that the tribe was called Vishāṇin because their helmets were horn-shaped or ornamented with horns [9]. Thus the proposed identification that the figure in discussion is the representation of the tribal-deity of the Vishāṇins seems very plausible.

NOTES

[1] E. Mackay, *Further Excavations at Mohenjo-daro*, II, pl. XCIV, 420.

[2] Ibid. loc. cit; and pl. LXXXVII, 222 etc.

[3] J. Marshall, *Mohenjo-daro and the Indus Valley Civilization*, I, 53-56.

[4] K. N. Sastri, *New Light on Indus Civilization*, I, 7-13.

[5] V. S. Agrawala, *Indian Art*, 34.

[6] *Rigveda*, 7.18.7.

[7] R. C. Majumdar and A. D. Pusalkar, ed. *The Vedic Age*, 251.

[8] Monic Monier Williams, *Sanskrit-English Dictionary*, 997.

[9] *Op. cit* [7].

A Microlithic Site from Shahabad (Bihar)

by BHUPENDRA PAL SINGH

While the author was engaged in exploration of the famous cave of Gupteshwar Dham in Shahabad District, he collected the following microliths. In general, this area seems to be of an immense archaeological potentiality as evidenced by a chain of sites yielding N.B.P. along the river Durgawati. Again, Jagebaraon, a village situated in the same tehsil in the foothills of Kaimur, yielded a neolithic celt along with N.B.P. and other important materials.

The physiographic features of the area where the present microlithic site is discovered provide an ideal habitational place to the prehistoric man. The place as surrounded by the ring of high hills and the river Durgawati offers seclusion and security of life.

The microlithic artifacts under study, were collected near Karamchat where the Bihar Government is going to construct a dam.

As far our knowledge goes, it is the first microlith-yielding site in Shahabad district. The typological study attempted here may serve as a link between the microlithic complex of Eastern Bihar and that of Eastern U.P. and Madhya Pradesh.

Nature of the Industry

The raw material used in the production of microliths is fine grained silicious element, which includes glassy quartz, flint, jasper, agate, chalcedony, chert, etc.

Most of the tools of the assemblage are surprisingly fresh, only a few having a yellowish tinge of patination. The microliths here constitute a series of flakes, blades and points, often worked, core trimmings and cores. Besides regular artifacts, a large number of cores were also found. Some of the worked cores present in the collection could have been used as scrapers. Some blades are worked out into points. Simple flakes are numerous, fine serrated and ribbed long blades are not many, so is the case with the geometric forms. Some unworked flakes which show sign of use are included in the list [1].

The occurrence of cores of various size, shape and variety and the presence of waste flakes indicates that it was a factory site.

Typological Classification

The artifacts can broadly be classified into two main groups :

(*a*) Finished artifacts
(*b*) By-products

Finished artifacts include the regular microlithic shapes, while the by-products include the core and unutilized flakes. The following table will show the major finished tool types as well as the by-products with their frequency of occurrence.
Finished artifacts include the regular microlithic shapes, while the by-products include the core and unutilized flakes. The following table will show the major finished tool types as well as the by-products with their frequency of occurrence.

	Types		Number
Finished Implements (84)			
(*a*)	Blade	..	52
(*b*)	Point	..	16
(*c*)	Scraper on blade	..	11
(*d*)	Lunate	..	1
(*e*)	Scraper on core	..	4
By-products (56)			
(*a*)	Core	..	45
(*b*)	Flake	..	11
	total	..	140

The table shows that out of a total of 140 microliths, blades (52), points (15) and scrapers (11) constitute the main bulk of the assemblage. Further classification of tool types has been attempted, considering the shapes and their functional aspects.

Blade

The largest number of artifacts belong to this group. These specimens have a great range of size varying from 0.6 cm. to 1.3 cm. According to technique and their forms, they can be divided into following.

(*a*) *Simple Blade* (Pl.XII, 1, 2, 3) These are roughly rectangular with parallel sides with one of the ends pointed. Sometimes, they have in their dorsal surface a pronounced mid-rib, while in others it has been chipped off. Twenty-four specimens are represented in the group.

(*b*) *Backed Blade* (Pl.XII, 4, 5, 6) These specimens also have parallel-sided edges, but one edge is purposely blunted. Mostly, there is single flake scar on the dorsal surface, which intersects the ventral flake surface and the working edge remains sharp. Ten specimens are there in the group.

(*c*) *Blades without parallel sides* (Pl.XII, 7,8) Eighteen specimens are represented in the group. Here the two sides are not parallel to each other, as it is found in other cases. One end is short and blunt, while the working edge remains sharp.

Point

Points are sixteen in number. The specimens have a pointed end which is secured by secondary working. Almost all the specimens are sub-triangular or almond shape. These are simple points, crude and have an unworked main flake surface. In some specimens, retouching has been done along the margins to obtain a pointed shape. Both the sides taper towards the working edge and emerge into a pointed shape. These implements with a thick triangular body may have been used as gravers, drills, etc. Typologically, points may be divided into the following sub-types.

(*a*) *Triangular Point* : (Pl.XII, 9, 10, 11) The specimens of this class are more or less symmetrical and triangular. The pointed end is achieved by the tapering of the margins. Generally, upper flake surface have mid-rib. Eight specimens are grouped in this division.

(*b*) *Asymmetrical Point*: (Pl.XII, 12) The Specimens under this group are asymmetrical in shape. Longitudinal flake scars cover the dorsal surface and the butt-end is blunt. The specimens are five in number.

(*c*) *Tanged Point* : (Pl.XII, 13) The single specimen of this group shows a small tang at the butt-end, while both margins taper to produce a pointed working end.

(*d*) *Tool with curved point* : (Pl.XII, 12) There is a single specimen of this group.

Scraper

This group includes tools, which once served for scraping. This group contributes eleven specimens in the collection. These are mostly thin and flat implements, sometimes with one side more sloping than the rest. Besides the primary longitudinal scars, secondary retouch is also present on the tools. The scraping edge is brought about by the intersection of dorsal flake scars with the main flake surface. According to their technique of preparation they may-be further sub-divided as follows.

(*a*) *Side Scraper* : (Pl.XII, 14, 15) The working edge is confined to the one side only. The flake scars of the dorsal surface are intersected with the main flake surface. Some secondary retouch is present along the working edge. Most of the specimens are prepared out of flake.

(*b*) *End Scraper* : (Pl.XII, 16, 17) The working edge is obtained by the intersection of the dorsal flake scars with the main flake surface. Three specimens are represented in this group.

(*c*) *Side-cum End Scraper* : (Pl.XII, 18) The working edge is not confined to one side. Mostly, specimens of this category are prepared on flakes. This group registers two examples.

(*d*) *End-cum-Concave Scraper* : (Pl.XII, 19, 20) This single specimen is typical in the whole group. The distal end of the dorsal surface shows the flake scars intersecting the main flake surface. The margins are concave due to the retouch.

Lunate (Pl.XII 21)

This group is represented by a single specimen. The arch edge is blunted, while the chord edge is straight and sharp and slightly concave.

Scraper Made on Core

These are some scrapers made on cores which are further classified on the typological grounds.

(*a*) *End scraper* (Pl.XII, 23) The specimen has sharp, often wavy, edge. This is due to either intersection of flake scar on the dorsal side with unworked ventral side or by the interaction of flake scars on both the sides.

(*b*) *Side scraper* (Pl.XII 24) The specimens of this group have the scraping edge parallel to the axis.

(*c*) *Steep scraper* (Pl.XII 25) These specimens are worked on both the sides. Flakes have been detached steeply from base upward while the scraping edge is obtained by the intersection of flake scars , which is often wavy.

By-Products

The by-products of the collection includes the cores, core-trimmings and waste flakes.

Core

About 45 cores are collected from the site. The striking platforms are usually faceted. According to their outward appearance and technique employed, they may further be subdivided as follows.

(*a*) *Having single platform* (Pl.XII, 27, 28) The cores under this category have longitudinal flake scars transited from one platform, in one direction only, running parallel to each other. The technique is fluting. Some of the cores are chipped completely and obtained a conical shape.

(*b*) *Having Double Platform* (Pl.XII, 26) Under this category, the flakes are detached from two platforms which are at right-angle to each other. In other variety, the striking platforms are parallel to each other but flake scars are not parallel.

(*c*) *Irregular Core* (Pl.XII, 29) These cores have an irregular shape, with frequent patches of cortex on the body and have more than one striking platform. Flaking is generally multi-directional and fluted.

Flake

This group includes utilized and unutilized flakes which have no definite shape. The utilized flakes, though cannot be tested as the other regular forms, confirm that they have been used. Generally, these flakes do not exhibit any retouch. They are generally pointed, sub-triangular, trapezoidal, rectangular or irregular in shape. The unutilized flakes include the core-trimmings which owing to their crudity and thickness, rule out the possibility of being taken into use.

Discussion

Typological study of microliths from Gupteshwar Dham reveals that the industry is non-geometric in nature. The foregoing account shows that blades, points and scrapers are the main occupants in the assemblage. The presence of geometric form is represented by a single specimen of lunate which is not very certain. However, from the fact above, we may conclude that the number of geometric form is very insignificant and the industry remains non-geometric. Some of the very common tool types are absent in the collection. This may be due either to inadequate sampling or their complete absence from the site.

With regard to the outward appearance of the artifacts, a few are patinated and the rest are fresh. The specimens are small and crude. Most of these microliths exhibit primary flaking with unprepared striking platform while lesser number of them shows a secondary chipping. Considering the fact that geometric elements come in the later stages of development[1], this industry with its crude non-geometric tools attests to a comparatively older antiquity. It is, however, difficult to assign some definite date to the industry, unless the finds are scienti fically processed in the stratigraphical context.

When the typological comparisons are drawn, it appears to be in full agreement with microliths especially of Mirzapur region[2]. Considering its crudeness, non-geometric nature and use of raw material, it may safely be linked up with the microliths of Singrauli Basin[3]. The present industry is not associated with any kind of pottery and bones.

NOTES

[1] D. H. Gordon, 'Stone Industries in the Holocene in India and Pakistan', *Ancient India*, 6, 1950.

[2] V. D. Krishnaswamy, and K. V. Soundara Rajan, 'The Lithic Tool Industries of the Singrauli Basin, District Mirzapur', *Ancient India* 7.

[3] B. P. Singh, 1962 Stone Age Industries on Balia Nadi in Mirzapur District (unpublished M. A. Thesis).

Reviews

Khajuraho—A Study in the Cultural Conditions of Chandella Society, by Vidya Prakash, M.A., Ph.D., Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University; Publisher : M./S. D. B. Taraporevala Sons. & Co., Bombay, 1967, pp. xxviii+217 with 110 photographs and 350 line-drawings, Rs. 65/-.

Khajuraho is an important centre of the art and architecture of early medieval India. Inspite of the ravages of time there still exist nearly thirty temples at the site to tell the glory that was Khajuraho. These temples are flooded with innumerable sculptures on the facades and in the niches and cellas inside the temples. The sculptures cover a large range of subjects. Besides the religious images there are countless scenes portraying various aspects of life of the people.

Vidya Prakash has given a new turn to the study of Khajuraho sculptures by treating them as records of social and cultural history of central India between A.D. 800 and 1200, the period when these temples were erected. The author has drawn upon these carvings to throw useful informations on the cultural conditions of central India in general and Chandella Society in particular. How did the people of these times live, love and fight ? What and how did they wear ? What were their ornaments and hairstyles ? Did they use cosmetics ? What were their games, amusements and pastimes ? What arts did they cultivate and what professions did they follow ? What were the main triats of their religious life and mode of education ? What sort of everyday life did they live ? What kind of furniture and household articles did they possess ? What were their moral and social values ? These are some of the questions that the author has very ably answered by critically analysing and interpreting the carvings of Khajuraho. He has corroborated his observations from contemporary literature and inscriptions and has refrained from being imaginative. The photographs have been well chosen and several of them are published for the first time. The line drawings and maps, which alone are a testimony to several year's hard labour, provide an added merit to the work.

The book consists of sixteen chapters, one appendix, a comprehensive glossary of technical terms and a select bibliography. First two chapters are introductory and give general informations about the political and cultural background of Khajuraho temples and the salient features of their art and architecture. In the section on sculpture the author has analysed the stylistic features of Khajuraho art. 'The figure sculptures of Khajuraho', he observes, 'display a distinctive physiognomy. Generally the face is oval and the chin round. The nose and the lips are prominent and the eyes and the eyebrows are sharply carved. The figure is tall and slender but the legs are sometimes unusually long and the poses difficult and tortuous' (p. 18). Next two chapters deal with dress, ornaments and hairstyles. The author has discovered a number of varieties of interesting garments in the sculptures. For example, 'a very close-fitting pair of trousers with folds formed above the ankles' (p. 27). People had a strong passion for ornaments but it is significant to note that Khajuraho sculptures 'do not provide any example of nose ornaments of any type' (p. 32). In the next three chapters cosmetics, music and dance, and amusements have been dealt with. The section on dance is very well written but it could have been further improved by identifying the dance sculptures with known poses of dance in technical literature of the subject. Eighth and ninth chapters deal with the military life and weapons. The chapter on the

latter gives an exhaustive account of all the varieties and sub-varieties of swords, daggers and spears etc. delineated in the Khajuraho carvings, but one would have expected the technical Sanskrit names of all the varieties of weapons which the author has not given. Chapters ten and eleven discuss industrial arts, professions of the people and the household furniture and articles of daily use. The author has drawn attention to several types of bags and baskets which appear quite modern in their look (plate XXII). Chapter twelve deals with education and learning. Some of the observations made in this chapter are based on flimsy grounds and need corroboration. In chapter thirteen the religion and religious life of the people have been discussed and the author observes that a very important feature of the religious life of Khajuraho was the mutual tolerance amongst the followers of different sects (p. 144). He does not regard the religious life painted by Krishna Mishra in the *Prabodhachandrodaya* which is full of hatred and contempt for the Buddhist and Jainas to be reliable, since he was a staunch Vaishnavite and his vision was coloured by his fanatic zeal.

In the last two fairly long chapters has been discussed the controversial problem of the erotic sculptures of Khajuraho, one giving a background of *mithuna* theme in Indian art, literature and religion, and the other providing an interpretation of the erotic figures of Khajuraho. The treatment of the subject is most exhaustive, critical and throughly documented. The author is of the opinion that 'the erotic sculpures of Khajuraho were a logical outcome of a number of factors already present in the religious life and usages of the times'. One will be certainly fascinated and swayed by the arguments and interpretations of Vidya Prakash even though he may not agree with him on all points.

The book on the whole is a very valuable contribution to art and archaeology, and it will equally interest the social historians of India. The book, I am sure, will serve as a model for similar intensive studies on the other monuments of India. The publishers also deserve praise for the quality printing and fine get-up, which are unfortunately rare in Indian publications on Art.

A. K. Narain

Khajuraho ki Deva Pratimayen (Hindi), By Ramashrya Avasthi, M.A., Ph.D., Lecturer, Department of Ancient Indian History & Archaeology, Lucknow University; Publisher : Oriental Publishing House, Civil Lines, Agra; 1967, pp. 22+285, Plates 72; Rs. 70/-.

Khajuraho group of temples in the Central India is world famous for its architectural grandeur and wealth of sculptures. These temples were constructed during the reign of the Chandellas, a medieval dynasty of Rajputs between 9th and 12th Centuries. Khajuraho has been attracting the archaeologists and art historians since the time of Cunningham. During recent years also several outstanding works on the subject have appeared from Indian and foreign scholars discussing one or the other aspect of the art and architecture of Khajuraho. But in no work any serious attempt was made to discuss the iconography of innumerable gods and goddesses depicted on the temple walls. Ramashrya Avasthi has very ably undertaken this task and deserves the credit of being the first scholar not only to describe and discuss the deities of Khajuraho with great detail but also to corrorborate them from the available iconographic texts. It is also the first authoritative work in Hindi on Khajuraho.

The work under review is a revised version of the thesis submitted for the degree of Ph.D. of Lucknow University in 1966. It has been divided into seven chapters. First chapter is introductory one and gives a brief account of the political history of the Chandellas and the existing temples. For the latter the author has largely depended on Krishnadeva's writings. In chapter 2 to 6, Ganapati, Vishnu, Sūrya, Navagraha and Ashṭa-

dikpālas have been discussed. In the last chapter some general observations have been made. There is a good bibliography and a useful index. Thus it will be seen that Avasthi selects only a few deities of Khajuraho for exhaustive discussion and analysis. We expect that he takes up soon the remaining deities also to form the subject matter of his other volumes. In the present one the selection of deities has been rather arbitrary. It would have been better if a certain well defined basis was adopted to select the deities for discussion in a particular volume.

The gods selected for the present volume (Ganapati, Vishnu, Sūrya, Navagrahas, Asṭadikpālas) have been critically analysed. The author has done well to give a brief history of the origin and evolution of each god which serves as a good background for the study of Khajuraho specimens. He has scientifically analysed the prescriptions of available iconographic texts and has made an extensive use of *Aparājitprichchhā* which appears to have derived much from the images of Khajuraho. The discussion is most exhaustive and even the minutest detail of icons has not escaped the notice of the author. Several unknown or hitherto unnoticed images of iconographic importance have been brought to light and identified. The arguments for the identification of deities have been critically and clearly set forth, though it is hard to agree on all points.

The work of Avasthi will undoubtedly serve as a valuable reference book on the iconography of early medieval India. It is a useful work for the students and scholars alike. So far this is the only work of its kind in Hindi and let us hope that this will inspire younger scholars to write original works on art and archaeology in Hindi and other Indian languages. Though the plates need improvement, the printing and get-up of the book are fine for which the publishers deserve congratulation but they are not justified to price the book so exorbitantly.

Vidya Prakash

The Arts of India and Nepal : 'The Nasli and Alice Heeramaneek Collection (An illustrated catalogue) by Rosenfield *et. al.*, Publisher : Museum of Fine Arts Boston, U.S.A., 1966, pp. 185, Eighty seven illustrations including twelve colour plates, Price not given.

Nasli Heeramaneek, the son of a Parsee dealer in art and antiquities, was born in Bombay. He inherited from his father the love and devotion for art which only grew with years and he became one of the better known connoisseurs of Asiatic art. He came into contact with Ananda Coomaraswamy and became a great admirer of the Museum of Fine Arts. Nasli had a vast collection of sculptures, bronzes, miniature paintings, bronze vessels, jewellery, ceramics and other art antiquities belonging to India, Nepal and other places. His valuable collection which is named after him and his wife Alice now forms a part of the Museum of Fine Arts, Boston. The work under review is a finely printed and sumptuously illustrated catalogue of this very collection of Indian and Nepalese works of Art.

There is a total number of 283 entries in the catalogue of which 1—109 are stone sculptures and bronzes and the rest are palm leaf manuscripts, painted book covers, manuscript paintings, Tankas, textiles, ceramics and minor works of art. These objects represent almost all the phases of art from the Indus Valley terracottas to 19th century brocades. The objects have been arranged chronologically and region wise. The entires are provided with all possible useful informations such as date, provenance, size and material of particular object. Whenever possible they have been compared with similar pieces known at other places. The description of objects is very minute and exhaustive. It bears testimony to the painstaking labour and wider perspective of Asian art on the part of those responsible for catalogue (entries).

Time and circumstances have deprived us of our own past heritage. It is a matter of satisfaction and pleasure that this catalogue will give an opportunity to the world of scholars to know closely the art subjects which have gone out of the homeland. Students of Asian Art are sure to benefit from this very valuable publication.

Vidya Prakash

The Iconography of the Buddhist Sculptures (Caves) of Ellora by Ramesh Chandra Gupta M.A., Ph.D., Head of the Department of History and Ancient Indian Culture, Marathawada University, Aurangabad : Publisher: Marathawada University, 1964, Rs. 45/-.

The Buddhist caves of Ellora have widely attracted the attention of scholars for their Sculptural wealth. But unfortunately the hundreds of Buddhist icons have never been thoroughly studied and analysed. The work of Dr. R.S. Gupta attempts at an exhaustive and intensive treatment of the subject. It is a good addition to the literature on Buddhist iconography.

The book consists of ten chapters. First two chapters are introductory, giving the significance of Ellora and the economic and historical background of the cave temples. In chapters three, four and five the author discusses the sculptures of the Buddha, Bodhisattvas and Buddhasaktis, There are five appendices dealing with the symbols, flying figures, dress and ornaments of the icones. There is a short glossary of technical terms and a biblography. The work is enriched by 80 half-tone, 300 line-drawings and two maps. The author apparently has put hard labour in preparing the work but the treatment is clumsy and lacks brevity. His chapters are disjointed and he fails to have grip over his material. It is more of the nature of a catalogue of the sculptures of Ellora and there is little of critical approach.

Vidya Prakash

Indian Palaeography by Ahmad Hasan Dani, Oxford : At Clarendon Press, 1963, pp. XVIII. 297, with 23 plates.

For long, Bühler and Ojha were considered as the most important books on Indian palaeography. The discovery of the Harappa culture, which could have brought revolution in the field of Indian palaeography failed to give any definite direction to scholars and the Indus script, inspite of several attempts, still remains a frozen mystery. However, discovery of large number of inscriptions, introduction of scientific methods in the field archaeology and increasing interest in the concepts of cultural anthropology gave new filip to the study of antiquities and paleography. During the last twenty years several books have come out on Indian paleography, but I have no hesitation in saying without in any way minimising the importance of other contributions, that A.H. Dani's is the most thorough treatment of the subject.

Dani has rightly divided the history of the study of Indian palaeography into three definite stages. The first, which covers the late eighteenth and early nineteenth centuries, was the period of the discovery of the inscriptions and the decipherment of the scripts used in them. The second stage starts with James Prinsep completing the process of decipherment in the thirties of nineteenth century. Cunningham, Burgess, Burnell, Ojha, Fleet, Bühler and many others collected, compiled and studied the inscriptions and prepared faithful charts of the letters. The main idea behind it was to use palaeography as chronometre by producing as accurately as possible the charts of the various writings from the original records so as to collect at one place all the scripts for the guidance of those who wished to read and interpret them. This was natural under the circumstances in which the decipherment of the inscriptions started. Bühler's Indian Palaeography marks the climax of this stage and his techniques were regarded, until recently, as standard. The third stage of compilation and

publication of the inscriptions along with their facsimiles started with the issue of regular volumes of *Epigraphia Indica* from the close of the nineteenth century. This step brought epigraphy and palaeography to larger readers and, more and more persons found themselves interested in its study and interpretation and new contributions were made. But it is Dani who gave Indian Palaeography the status of an independent subject to be studied for its own sake. Thus he has ushered in the fourth stage, if I may say so.

The real contribution of Dani in the field of Indian Palaeography is his attempt to interpret and explain the evolution of writing in cultural context. Now several scholars consider writing as an item of culture and interpret it as such and Dani seems to be in line with them. His study of Indian script in cultural context and in the light of technique employed and the tools used gives it a new dimension. He does not lay much emphasis on the exact reproduction of the letters; rather, he emphasises the movement of the hand which is more important in the formation of the letters. With a deep insight he classifies and traces the evolution of script and solves many problems satisfactorily. To him script is no longer a time-scale but is an item of culture.

Dani analyses and classifies all the five hundred and thirty seven symbols of Indus Valley script into eight categories of living beings, nineteen categories of stylized objects and many other categories such as Ovals and their parts; Triangles, Angles & Crosses; Quadrangles and their parts; Numerals, Brackets and others. As a result of this classification and analysis he observes that 'the actual number of signs in the Indus script is twenty seven objects and twenty seven geometrical forms, besides numerals, brackets, and two magic emblems.' (p. 19). He further opines that the number "is increased to four hundred and seventy four (the remainder sixty three being numerals, etc.) by following two principles, namely :

(i) by combination with other signs;
(ii) by addition of strokes (a) internal, (b) external, from 1 to 6, besides the arch-like signs. The combinations are always with some recognizable objects, and strokes are found added to all but the homo-, snake-, wheel-, vehicle-, and bow-and-arrow- signs." (p. 19). Whereas it is difficult, in the present state of the materials, to asses correctly Dani's contribution to the study of Indus script, his reviewer has no reason to doubt that it will be of help to all those who are actively and optimistically engaged in the task of deciphering the Indus script.

While dealing with the origin of Brāhmī script, Dani analyses and classifies Brāhmī characters into two categories: original forms and those made by additional strokes, C.S. Upasak also classifies these characters into original and derived forms. Dani regards three vowels—*a*, *i* and *u*, and nineteen consonants—*ka*, *kha*, *ga*, *cha*, *ja*, *ta*, *tha*, *da*, *na*, *pa*, *ba*, *ma*, *ya*, *ra*, *la*, *va*, *sa*, *sa* and *ha*—a total of twenty two letters as original forms, a number which coincides with the number of signs found in North Semitic or Aramaic. Out of these twenty two forms he could find only eleven signs from the North Semitic and Early Phoenician combined, which are somehow similar to corresponding Brahmi signs. He also correlates all these twenty two sounds of Brahmi with the twenty two letters of North Semitic except *u* and *o* in Brahmi and *Kheth* in North Semitic. On this ground he considers that 'Indus Brahmi was created on the basis of North Semitic letters (p. 28).

But a careful examination of Dani's classification, Fig. 2, p. 27, shows that the number twenty two, arrived at by him, is an arbitrary one. For example, among the vowels he considers the triangle only three formations of *a*, *i* and *u* and ignores the triangle form of *e* which on the same grounds should be included in the original forms. Among the consonants also, he has selected letters to suit his purpose. For example he considers *ga* and *sa* as original form but actually

sa is made by adding a stroke to the left leg of *ga*. Similarly *sa, sha, ha, la ya, pa*, and *pha* can be regarded as derivatives of only one sign which can be formed with the help of adding strokes of various points. Some more instances of this type can be pointed out.

As regards the similarity of the letters of Brahmi on one hand and North Semitic and Early Phoenician on the other, he has repeated the technique of Buhler, which has already been controverted by Ojha, Pandey, Upasak and others.

While dealing with the origin of the script such as Brahmi, one must consider that there are two elements in any script, viz. form and the sound. Actually no correlation between the form and the phonetic value can be expected in any system of writing of the world and Brāhmī is no exception. Simple geometrical forms such as the Brāhmī letters need not be the monopoly of anyone among the ancient peoples. On the other hand the scientific classification of the *aksharas* of the Sanskrit *varnamala* on phonetic basis was already known before Asoka. We do not understand why so much exercise is made to correlate the origin of Brahmi with any of the known systems of writing ? Why so much emphasis on the monogenesis of writing ?

Dani rightly includes Ceylon and South-East Asia in his study for Indian culture along with the Indian script reached these places. However, he does not include the Brāhmī script prevalent in the Central Asia and Tibet. While dealing with Kharoshṭhī script he explains its origin and development in India and Central Asia in the same cultural context.

No review of the book can be complete without expressing on admiration for the hard labour the author has put in collecting the data for illustrations, and which are so well produced.

A. K. Narain

Shaikhan Dheri Excavation (1963-64 Seaosns) Published in Ancient Pakistan, Bulletin of the Department of Archaeology, University of Peshawar, Vol. II—1965-66 by Ahmad Hasan Dani, pp. 16-214, plates 51, line, drawing, figures 58, site plan, several charts etc.

The excavations at Shaikhan Dheri, which were undertaken in search of the second city of Pushkalavati, in two seasons 1963 and 1964, have revealed undoubtedly a city founded by the Indo-Greeks who came from Bactria. Sir Mortimers' excavations at the Bala Hisar mound provided a definite sequence of cultures in Ghandhara from circa 6th to 1st centuries B.C. Dani's excavations at Shaikhan Dheri, which is opposite Bala Hissar, about twenty two miles north of Peshawar, continues the story upto the end of the Kushana power. Needless to say the results of Dani's work at the site are of great value.

According to Dani, the city was most probably founded by Menander, in about the middle of the second century B.C. The chronology suggested by Dani is strengthened by radio-carbon dates he has obtained for the samples from his excavations of the site. On the topmost layers a number of coins of Vasudeva I (Siva-Bull type) were recovered and these were the last coins on Shaikhan Dheri. It is clear that the site was given up during his reign, perhaps on account of flood. It has been claimed by the excavator that the materials, unearthed so far, which include as many as 475 coins, have to say something definite on the various knotty problems related to the chronology of the Indo-Greeks, Sakas, as well as those of the Gandhara art.

Apart from the coins the site has yielded a lot of antiquities of almost every kind. Special mention, however, must be made of the statue of Hariti (pl. XVI) and that of the Buddha (pl. XVII) from the House of Naradakha (pl. VIII No. 1), a Buddhist *acharya* whose name was recorded at the base of a pedestal (pl. XXII) belonging to a relic casket, and who flourished during the hey day of the Kushanas.

Dani also arrives at certain conclusions regarding the chronology of the Yavana-Saka kings on the basis of the stratigraphy and material remains he has obtained at the site. He agrees with

the reviewer's date of Menander, and the chornological proximity of Agathocles with Menander. But he also considers Apollodotus as chronologically close to Menader and therefore disagrees with the reviewer's theory of two Apollodotuses. In view of the limitation of space we propose to discuss this matter as well as Dani's opinion about the place of Soter Megas elsewhere, for we still feel the necessity to agree to differ with the author.

We are glad that the Shaikhan Dheri excavations have provided the material and the insight for what Dani remarks on pp. 39—40, "Any school of art has to be studied in its total circumstance within the area and society where it develops. Its chronology has to be built on its own right".

A. K. Narain

Religion in Art and Archaeology, (Vaishnavism and Saivism) by J. N. Banerjea, M.A., Ph.D., F.A.S., F.N.S.I., Formerly Carmichael Professsor & Head of the Department of Ancient Indian History and Culture, University of Calcutta; Publishers: University of Lucknow, 1968; pp. 134, Plates XIX, Rs. 30.

The workers in the field of Art, Iconography and Religion are already indebted to the late Prof. J.N. Banerjea for his monumental book on Iconography and many illuminating papers on one or the other aspect of art and religion. The publication under review is another significant work from the pen of the learned author. It is a collection of a series of five lectures delivered by Prof. Banerjea under the auspices of the Radhakumud Mookerji Endowment lectures at the University of Lucknow in 1961-62. It is a matter of profound regret that Prof. Banerjea did not live to see the publication of his highly learned and informative discourses. It is also unfortunate that Lucknow University took nearly five years to publish these lectures.

Five lectures of the learned author form five chapters in the book, first two chapters are devoted to Vaishṇavism in archaeology and art. The first clear mention of the word *bhakti* in theistic context, observes Prof. Banerjea, appears in the *Śvetāśvatara Upanishad* and the later Vaishṇavism owed its origin to the deification and worship of the human hero Vāsudeva Kṛishṇa. The cult, of which Vāsudeva Kṛishṇa was the central deity, gradually incorporated Vedic Solar deity Āditya, Vishṇu and the cosmic deity Nārāyaṇa described in the later Vedic, Epic and Smriti texts. Banerjea has analysed the archaeological and sculptural data to throw useful light on the origin, and subsequent evolution and growth of Vaishṇavism and its prevalence in different parts of India during pre-Gupta, Gupta and post-Gupta periods, until the end of the early medieval period in the 13th century A.D.

Chapters three and four deal respectively with Śaivism in archaeology and *liṅga* worship and Śaivism in art. The literary data about the prevalence of the worship of Śiva in the north during the centuries immediately preceding the Christian era have been supported by the archaeological evidence mainly numismatic and glyptic. The author, however, admits the absence of any epigraphic evidence belonging to pre-Christian era to throw any light on the nature of Śaivism in early days. Banerjea has discussed the Mathura stone inscription in relation to the Lakulīśa sect. He regards the earlier hypothesis of R.G. Bhandarkar about the approximate period of Lakulīśa, being first quarter of the second century B.C., to be untenable. He reiterates his earlier opinion that 'Lakulīśa might not have been the actual founder or the Pāśupata order, but his contributions to it as its first systematiser and organiser were so great that in later tradition he was given this role' (p. 52). Prof. Banerjea discusses the role of Mattamayūra form of Śaivism referred to in the central Indian inscriptions of 10th-11th centuries A.D. He has thoroughly analysed the views of other competent authorities on the subject and has differed from them at several points. For example, he would not agree with V.S. Pathak who suggested the region of Panjab for the location of the place with which the name Matta-

mayūra was associated (p. 59). Similarly he regards the suggestion of Goetz 'peculiar and unwarranted' that the Mattamayūra Śaivas were associated with the unsocial Kaula-Kāpālikas and that they were indirectly responsible for some of the grossly erotic reliefs on the medieval temples of Khajuraho (p. 63). The author of this review, who had occasion to discuss this problem with the late Prof. Banerjea, agrees with him that there is no clear literary or archaeological evidence to justify association of this moderate Śaiva order with the erotic theme of Khajuraho temples. The association of even the Kaula-Kāpālikas with these carvings is doubtful. The chapter on Śaivism in art attempts to discuss critically the phallic representations of Śiva and its different phases. Śiva has been depicted anthropomorphically in thousands of sculptures in various forms. These have been scientifically classified and analysed with the help of select examples. The treatment of the images illustrating Śaiva tenets, like Lakulīśa, Nṛityamūrtīs and syncretic icons is particularly interesting.

Fifth and the last chapter deals with the relationship of architectural art with Vaishṇavism and Śaivism in ancient and medieval India. Important existing Vaishṇava and Śaiva temples have been studied from the cult point of view. Prof. Banerjea observes that the ritual needs of the sectarian worshippers were responsible to a great extent for the architectural types of temples. The position of certain images were rigidly fixed in the architectural complex. Thus 'in many of the Vaishṇava temples of the early medieval period, both in northern and southern India, the three incarnations of Vishṇu, Vārāha, Narasiṃha and Vāmana-Trivikrama were shown as the Pārśvadevatās on the southern, western and the northern faces respectively'. (p. 91).

The book is an outstanding work, full of informations which the learned author has presented in his characteristic critical style. Though many of the views contained in this work were already expressed by him in his earlier writings, the value of the work is unaffected. The greatest merit of this book is its quality of precision and intelligible treatment of a highly complex subject. It will be immensely useful to the students and researchers of Indian religion and iconography.

Though the get up and type face is generally satisfactory, there are a number of printing mistakes. On page 92 alone four printing mistakes can be detected (Trivikrama is written as 'Trivikarama', Narasiṃha as 'Narashimha', Krishṇāyana as 'Krishnaana' and Devala Mitra as 'Devata Mitra'). Such errors in standard publications are unfortunate. The plates also do not come upto standard. Considering the amount of printed matter, the price of the publication is too high. At least University publications, the primary aim of which is not profit, should be priced moderately.

A. K. Narain

The Dynastic Arts of the Kushans by John M. Rosenfield, University of California Press, Berkeley and Los Angeles 1967, pp. xliv+377, 16 plates of coins and seals+50 plates illustrating 167 text figures, 3 maps and several line drawings.

It is an irony that despite most abundant source material the history of the Kushanas should be replete with unresolved problems of every kind. John Rosenfield's book which primarily deals with the 'place and importance of the royal portraits of the Kushan emperors in their relationship to India and the Near East' is a major contribution and deserves high praise for tackling a little trodden aspect of Kushana art and civilisation. Although the work essentially intends to be a history of art, it is a mine of information on Kushan history which the author has presented with clarity of vision and critical scholarship. He has a perfect grip over the sources. His mastery over the intricacies of Kushana art and numismatics in particular and Indian Art and iconography in general are reflected in every page of his writing. The amount of painstaking labour the author has put in collecting his illustrative material is most impressive.

The book consists of nine chapters and three appendices. There is an exhaustive bibliography at the end which hardly excludes any work even with slightest relevance to Kushana history. Starting from an account of the beginnings and creation of Kushana empire in chapter I, the subsequent chapters upto V deal with Kushana kings, and the Saka and Parthian rulers. The author has given first, a detailed account of the biography of these rulers and the history of their times, and then analysed the portrait delineations from their known coinage. The minute and objective study of these portraits by the author reveals many new facets about the changing patterns of Kushana royalty, and stylistic evolution of the art of portraiture. The author rightly observes that the standing figure of Vima Kadphises on copper coins is 'the most direct prototype' for the stone statue of Kanishka at Mathura and that it 'helps demonstrate a close correspondence between the art of the dynastic shrines of Mathura or Surkh Kotal and the symbolic spirit of the Kushana coins' (p. 26). The author does not favour the theory of any interregnum between Vima Kadphises and Kanishka and points out the close agreement between Vima's and Kanishka's imperial symbols on their coins on the one hand and between monumental sculpture on the other as an additional support (p. 40). The account of the history of Kanishka, his conquests, empire and the various legends connected with him are lucid and readable. With the help of Kanishka's portraiture on coins and the Mathura portrait, the author observes that from the time of this ruler spear became a prominent part of royal regalia which was probably intended more as an emblem than as a weapon in a practical sense. Similarly he regards the goad held in the hand of Kanishka on his coins as an attribute of a master of ancient India's greatest instrument of warfare. Rosenfield makes a closer observation of the types of headgear carved on the Huvishka coins and suggests that this evokes the memory of the opulence of Assyrian kingship. One may not disagree with this suggestion particularly when the parallel examples are noticed in the Hatra and Kommagene royal images.

Chapters VI and VII are intended to study in detail the Mathura portraits from the Gokarnesvara mound and the Mat shrine and the Kanishka and Iranian portraits. According to the author the royal portraits of Mathura or Surkh kotal were not an isolated phenomena. They reflect a strong awareness of activities within the Iranian culture sphere. Chapter VIII, dealing with the stylistic and iconographic aspects of the Mathura imperial portraits, attempts at a minute and critical study of clothing and the attrients in the hands. The author advances sound arguments in favour of the view that the squatting Surya image were derived from Kushan royal portraits. The last chapter is a thorough analysis of the Kushan figures as donors and devotees in Buddhist sculpture. Rosenfield has rightly noted that "these images help to place the Kushans in a cultural milieu of considerable detail, showing factors of patronage and spiritual conviction which underlay the vigorous activity of the Buddhist sculpture workshops" (p. 215).

The three appendices at the end on (i) the date of Kaniskha (ii) the Kanishka reliquary and (iii) the inscriptions pertaining to the Indo-Scythian dynasties at Mathura are very useful. It is indeed most gratifying for the present reviewer to note that his view on the date of Kanishka, as discussed by him in the Kanishka seminar held in London in 1960, finds acceptance by the author of this book. The table of dated inscriptions given in Appendix III will be found by the readers as of great help. The illustrations are very well chosen and the reproductions are of the highest quality.

Needless to say, this contribution of Rosenfield is not only very substantial but one whose great impact will be felt by all future students of Kushan art and history.

A. K. Narain

PURĀTATTVA

Bulletin of the Indian Archaeological Society

No. 2 1968-69

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Outlines of the Archaeology of Nepal

by N. R. BANERJEE

Introduction

Archaeology as a discipline of research serves Clio the Muse of History as a handmaiden, for filling gaps that historical records have failed to bridge. Its purpose otherwise is to probe those aspects of human life that are beyond the reach of historical research. It undertakes the task by the study of the standing monuments of art and architecture, and all other relics of human handiwork that can be recovered only by archaeological excavation, and are eventually preserved and displayed in the museums. It also enjoys at once the privilege and responsibility of preserving the rich heritage of the past for posterity, and of course of interpreting it for everyman's comprehension.

Its scope is the entire range of human life and activities extending from the dimmest and remotest past of prehistory, through the intermediate phase of protohistory, both before the age of written records, and the entire gamut of the historical periods reaching almost upto the recent times.

Regardless of the as yet inestimable but surely remote antiquity of Nepal, which has the unique distinction of harbouring the tallest mountains in the world, the archaeology of Nepal is very young, perhaps the youngest in the world. The work in the field is being carried out in the main by the Department of Archaeology, under the Ministry of Education, H.M.G., instituted in 1952. It is of course a rapidly growing organisation and its activities presently cover(i) exploration and excavation of ancient sites, including prehistoric studies, (ii) conservation of ancient monuments, including chemical conservation, (iii) collection and publication of inscriptions and coins, (iv) survey of sculptures and architecture, (v) maintenance of museums, (vi) research and (vii) publication of academic works and technical reports, all in the field of archaeology. The legal aspects of the archaeological work in the country are controlled and governed by the *Prachin Smarak Samrakshan Ain* (Ancient Monuments Preservation Act) of 2013 V.S. (A.D. 1956).

Though it has not yet been possible to isolate all the diverse cultural patterns that may have evolved at one time or other in the vastly variegated terrains of the country through the corridors of time, not to speak of studying them fully, or working out a complete sequence of cultures among them, the work is already on the anvil. The influence of the isolating and mountainous geography of the country with its concomitant ensemble of flora, fauna and climate on the peoples of Nepal throughout her hoary history has been profound. This itself is a clue to the understanding of the patterns of culture that have emerged on the embroidered chessboard of many hues that Nepal represents, imbibing, combining and welding local and exotic elements together.

Scarcely more than a beginning has been made in the study of the lives of the diverse peoples that constitute the Nepalese populace, but there can be no doubt that they bear echoes till this day of the lives of the long last past and should provide useful guidelines in the study of the ancient beginnings and later moorings.

The Kaleidoscope of the Sequence of Cultures in Nepal

A. THE INDIAN SCENE ACROSS THE BORDERS

As a result of the patient endeavours of archaeologists in India for over a hundred years, a rich ensemble of a sequence of cultures in India has come to light, though there are as yet many loose ends here and there. Apart from the discovery of extensive remains of the prehistoric Stone Age man in the form of old stone age tools, in two stages, followed by those of the neolithic civilization going back to the 4th millennium B.C., the sequence includes an assemblage of successive or partially overlapping cultures comprising the Harappa civilization (2300-1750 B.C.), multiple chalcolithic cultures, with regional characteristics, with common as well as mutually exclusive elements (2000-700 B.C.), spreading from Rajasthan to West Bengal with ramifications in certral and western India, multiple deposits of sophisticated and stylized hoards of copper weapons, of an as yet unknown chronology, a widespread megalithic culture of sorts (1000 B.C. to 1st century A.D.), besides the so-called cultural remains (1000-400 B.C.) of the Aryan settlers of the Ganga plains, distinguished by a *de luxe* ceramic were called the Painted Grey Ware. The last ushers in the early historical period towards its terminal phases, overlapping with a distinctive ceramic called the Northern Black Polished Ware (500-200 B.C.). The interrelationships between one and another of this rather vast assemblage, however remain, yet to be determined, as also their correspondence to or correlation with any firmly identifiable ethnological or linguistic groups.

The cultural scene in India would naturally be expected to show some close contacts with the neighbouring lands of Nepal, especially as such contacts have been proved between India and her neighbours in the north-west, Central Asia and even in the Far East, beyond the seas, helping to understand the cultural history of Nepal.

B. THE SCENE IN NEPAL

(*i*) *Prehistory*

In contrast, however, the earliest settlements in the Tarai of Nepal, as revealed by the limited excavations carried out so far do not indicate a date range before 600 B.C. in the *Tarai* region, and those in the central valley of Kathmandu do not take us before the 5th century A.D. It cannot, however, be inferred that the region was a vacuum before this date. The present lack of evidence would have to be set down to the paucity of work rather than of evidence.

Tradition has it that the valley was anciently a great lake, the waters of which were released through an opening cut by the sword of *Manjusri.* Apart from the allegorical and legendary and even anachronistic aspects of the matter, it can be stated that geology has confirmed this phenomenon. The valley emerged as dry and as a result of the impounded waters finding their way out of the valley through a deep and narrow gorge at Chobhar, cut by the very pressure of the waters, after struggling incessantly to find a way out for thousands of years. The great event took place, according to the calculation of the geologists, about 200,000 years ago.

So far not a single palaeolithic tool of the stone Age Man has been found in Nepal. If however, there was any human life in the area at the time in the prehistoric past, even in its uppermost and latest phase the traces thereof

could be found either at the periphery of the lake or in the thick of its silty depsoits which can be clearly seen in the stratified deposits of the valley section, as in Switzerland. This underscores the need for a patient search in these deposits or in the cliff sections of gravel deposits in the river valleys in the *Tarai* or the terraces of mature rivers all over the country.

Toni Hagen has drawn our attention to the existence of numerous man-made and natural caves in the region of Thakkhola in the extreme north, where remains of the prehistoric man are likely to be found. Several other caves are known to explorers. All these still await the probing hand of the archaeologist. Professor Giuseppe Tucci has, in his report of exploration in Western Nepal, also indicated the sporadic finds of several archaeological remains, including stone-made chambers, stone or wooden posts, serving as memorials to the dead, reminiscent of a widely prevalent megalithic culture of an unknown cultural or chronological association except in so far as they recall the practice prevalent among some Nagas of Assam. The practice of erecting some kind of stone memorials, recalling menhirs, are even now prevalent among the Kirats in eastern Nepal, and must be the relics of an older practice.

The recent discovery of unmistakable megalithic remains in the neighbourhood of Kalimpong by the West Bengal Directorate of Archaeology raises fresh hopes of finding intermediate relic in the intermediate regions of Nepal as well, and linking them up with as in India as well as Tibet. The matter is of striking interest and needs much investigation as a problem in Nepalese archaeology.

The periodic and sporadic reports of the find of polished stone axes in the region of Panau to the north of Kathmandu and elsewhere in Nepal and Sikkim, and the recent haul of a large collection of neolithic tools from near Kalimpong (India) besides the occurrence of megalithic burials of an unknown cultural association in the same region (Kalimpong) have raised hopes for similar finds in the different and comparable horizons of Nepal.

That these polished axes had been used anciently as hoes for cultivation, by fixing them with leather thongs or ropes of some kind to the end of a stick to be operated manually is distantly echoed, conservatively, by the still prevalent Newari custom of hand cultivation in the Kathmandu valley by means of iron or steel spade with curved tang fixed at the end of wooden handles. The persistent practice may prove itself to be a relic of the neolithic times. The situation easily calls for intensive work in search of the missing trails of the Stone Age man as they seem likely to be found by patient exploration.

(ii) *The Beginnings of the Historical Period*

It is well-known that Lumbini, the birth place of the Buddha, is within the borders of Nepal. The spot is marked by an inscribed pillar of stone erected by Asoka in the 21st year of his reign. Buddha himself does not seem to have travelled into any other part of Nepal. This is borne out by the fact that neither Fahien nor Yuan Chwang, the two renowned Chinese pilgrims who came all the way from China on a pilgrimage to all places hallowed by their association with the Buddha, did not visit any other places except Lumbini and Kapilavastu in Nepal. Yuan Chwang, who visited the court of Harsha of Kanauj, has of course mentioned Amsuvarma as the contemporary ruler of Nepal.

The evidence of at least two hemispherical and earthen *stupas* at Pulchowk and Patan out of a group of five in the Lalitpur area is attributed by tradition to Asoka, and the one at Chabolhil is attributed to Charumati, daughter of Asoka. The truth of the matter can only be established by the spade. Though the *stupas* at

Swayambhu and Bodhnath are attributed by tradition to Tibetan workmanship at an unknown date, they could have come into existence only after the introduction of Buddhism in Tibet. Here again the help of the spade alone could tell the truth, or else the mystery will linger unchallenged. For the present, however, these constitute the only relics of an unknown age and may or may not fill the lacunae before the historically known Lichchhavis.

(iii) Early History

Literary records in the form of *Vāṃśāvalīs* of much later date than the history to which they relate wax eloquent about the Kiratas as the earliest rulers of Nepal. There are till now neither material remains nor any archaeological evidence of these folks, not to speak of any inscriptional records. Strangely enough, there is no reference to them in the entire range of the numerous inscriptions of the Lichchhavis, who are supposed to have been their successors. The inscriptions, however, repeatedly mention the levy of a tax to fight off the Mallas who had no doubt been a thorn in the side of the Lichchhavis, apart from recording a showdown between the Mallas and Manadeva, the first historical Lichchhavi king known. In these days of science which has made it possible to recognize and date cultural remains of the remotest date, for instance the complete history and civilization of the Sumerians of Iraq, going back to the end of the fourth millennium B.C., all traditional beliefs, regardless of their value must eventually be tested on the touchstone of objectivity. It has not yet been possible to build up even a complete and connected account of the Lichchhavis or Mallas, who are both known to *Manusmriti* and are mentioned in the oldest Buddhist literature as living in the days of the Buddha, in the area around Vaisali, in Bihar and Kusinara and Pawa, in Uttar Pradesh, India.

Even in regard to the Lichchhavis, though spoken of as a republican tribe living around Vaiśāli in the Muzaffarpur District of Bihar, there is no evidence, at least for the present, in the *Tarai*, though they are referred to in the coins of Chandragupta I who ruled from A. D. 320-330 and in the Allahabad Pillar Inscription of his son and successor, Samudragupta (330-375). In fact, the provenance of their inscriptions, which should indicate the extent of the territories under their control point to an area delimited by Dharmasthali in the north, Palanchok in the east, Gorkha in the west, and Lele in the south. The Lichchhavis used the same script as was employed by the Gupta emperors of India during what is known as the Golden Age of Indian history, and the Saka era, beginning in A.D. 78 . Their earliest dated inscription takes us back to the year A.D. 464 (386 Śaka era). The history of the country before this date is mostly a blank, as far as records are concerned, but for a few landmarks here and there.

Professor Tucci has indicated the immense potentialities of discovering more antiquarian remains, particularly in the west and north, that may go a long way towards filling up of the persistently gaping lacunae in the history and archaeology of Nepal.

(iv) Later History, Antiquities and Monuments

The framework of later history is simple, though there again one is confronted with lacunae which remain to be filled archaeologically, despite the circumstance that, we are on surer grounds than ever before.

The teeming multitudes of the antiquities that were produced by the arts and crafts of Nepal in the form of tottering or standing monuments of sorts and a plethora of images and sculptures bespeak the sympathy of the nation. The task on hand is to sort them out, arrange them chronologically and take steps for their preservation to enable detailed study, and reclaim the lost facets of the practical lives of the peoples through the corridors of time since the Muse of History

is otherwise mute. The value of these relics in buiding up the complete history of the arts and architecture as of the religions they subserved, and the involved technology of quarrying, carving, carpentry and engineering is immense and hardly needs to be stressed.

Resume of the Archaeological Work in Nepal

(*i*) *Prehistoric Expedition*

Though as yet no substantial traces of the prehistoric man have been found in Nepal, the circumstance is to be attributed to the comparative paucity of work in the field. A brief and preliminary work was, however, undertaken by Dr. R.V. Joshi, Superintending Archaeologist, Archaeological Survey of India in 1961 in selected areas in the valleys of the Vishnumati and Bagmati, at the request of the H.M.G. and at the instance of the Indian Cooperation Mission. Though Dr. Joshi's work did not yield any positive results beyond recording the nature of the riverine deposits of gravel, it served at once to train the local personnel in the methodology of prehistoric field work and at once to indicate the scope and emphasize the need of more sustained work in the direction. A brief report of the work has been published in *Indian Archaeology* 1961-62 *A Review* and a fuller report is awaited. This work was the first of its kind in Nepal.

(*ii*) *Exploration and Excavation of Ancient Sites*

The cultural framework established by the archaeologists in India as indicated above, could well serve as a readymade guide for traces of cultural contact between Nepal and India since the earliest days. For the present, however, the backward thrust of the Nepalese culture in the *tarai* shows some obvious contacts in the region about the middle of the first millennium B.C. This was about the time of the Buddha at the earliest level of occupation in the area on the basis of the find of a somewhat later form of the distinctive ceramic ware called the Painted Grey Ware. It may be recalled that this ware has been provisionally recognized as the *de luxe* pottery of the Aryans who settled in the Ganga plains and is dated between 1,000 and 400 B.C. Nepal catches up with it at a stage slightly earlier than its contact with another equally distinctive but later ceramic ware called the Northern Black Polished Ware datable to *circa* 600-200 B.C.

The discovery in 1893 of the well-known Lumbini Pillar inscription of Asoka of the twenty first year of his reign by A. Fuehrer, a German archaeologist, then in the employ of the Government of India, was followed by the discovery in 1896 of the Nigali Sagar pillar with Asoka's inscription recording the enlargement by his orders of the *stupa* of Konakamuni, a previous Buddha, in the fourteenth year of his reign and a visit to inspect the works and personally worship the hallowed spot in the twenty-first year by Major Jasokaran Singh of Balarampur. These were epoch making discoveries as they focussed the attention of the world upon the land of the Buddha with an irresistible charm. Though not strictly in formal sense Asoka may go down in history as the first archaeologist of the subcontinent with an eye on the needs of posterity for having rendered yeoman's service to the history and culture of Nepal as the first Indian ever in the field of international cooperation in repairing or preserving indelible archaeological and historical remains and records for the benefit of the countless generations of the future.

Almost simultaneously the stump of a bare pillar alongside a *stupa* was found at Gotihawa in the same region. The unrecorded excavation of the *stupa* by Major Waddel, a British officer of the Indian Army, led to the discovery of bones, recognised as animal bones, without further attempt at any scientific examination of the material. The excavation in 1897 by W. Peppe of the *stupa* at Piprahawa on the borders of Nepal, containing the inscribed relics of the Buddha laid

to rest by his Śākya brethren, at a distance of 9 miles from Lumbini, was yet another milestone that focussed the attention of scholars all the world over upon the region around Lumbini as being very crucial for the study of the early historical period in the subcontinent. Eventually these discoveries led to the excavation of the Nepalese site of Tilaurakot, near Taulihawa, in the Lumbini Anchal, at a distance of 19 miles (14 miles as the crow flies) to the west of Lumbini, in 1899, by P.C. Mukherjee, an Indian engineer, with the permission of the then Nepalese Government.

Though no positive evidence was found by Mukherjee to clinch the issue regarding the identification of the site of Kapilavastu, he tentatively identified the site, on the basis of the well-preserved nature of the site, the existence of the traces of a mud fortification and a protective moat around, and its tallying to an extent with the description left of it in relation to other sites in the neighbourhood by Yuan Chwang with Kapilavastu, the capital of the Śākyas, regardless of its divergence with the descriptions of the earlier Chinese pilgrim, Fahien. This was at once revolutionary and attractive, and the provisional identification was gratefully accepted by the Nepalese. It should be recorded in this context that the *stupa* to the east of site, which was also opened up by Mukherjee, did not yield any relic worthy of consideration. Nor was any specifically Buddhistic relic ever reported from this or the subsequent brief excavations at Chitradei by Mukherjee on the opposite bank of the Ban Ganga facing Tilaurakot.

At the same time Mukherjee excavated the base of the pillar at Lumbini, reclaimed the scanty remains of the brick-built *Maya Devi* temple, containing fifth century sculptural panel of the scene of Buddha's Nativity, and identified a few *stupa* like structures on the site, along with the remains of a monastic establishment besides the tank in which queen Maya Devi is supposed to have bathed herself before the birth of Buddha.

Mukherjee also carried out fairly extensive exploration in the area, bringing to light many ancient sites that urgently claim and await excavations. All this was remarkable achievement. Mukherjee's book on the work entitled '*A Report on a Tour of Exploration of the Antiquities in the Tarai, Nepal*', Calcutta, 1901, is a veritable mine of information and the first publication of its kind in respect of Nepal, published by the Archaeological Survey of India.

These important discoveries were followed by large-scale clearance operations around the pillar and temple in *Lumbini,* after a long gap of nearly 35 years, in 1933-34, at the enlightened instance of His late Highness Field Marshall Kaiser Samsher Rana. These works resulted in the exposure of an extensive area to the south-west of the pillar, revealing straggling remains of monasteries and *stupas*, and a host of diverse antiquities, including sculptures, moulded bricks, coins, and of course pottery that span an extensive range of time from *circa* 6th century B.C. to 9th century A.D.

A few sherds of the Painted Grey Ware, found in the exposed trenches and on the surface, indicate the ancient moorings of the site.

The first scientific excavation in Nepal was, however, carried out by Shrimati D. Mitra, a senior officer of the Archaeological Survey of India, in a joint undertaking with the Department of Archaeology, under a scheme sponsored by the Indian Cooperation Mission, in 1961, when she excavated a trench at Tilaurakot the old site first brought to light by Mukherjee. She also exposed partially the base of the pillar at Lumbini and explored a large number of sites to the west of Lumbini. Shrimati Mitra's report of her work entitled '*Excavations at Tilaurakot and Kodan and Exploration in Districts Bhairhwa and Taulihawa*' is in the press. This will form the first large and exhaustive work on the subject.

Subsequently again the site was excavated by Shri T.N. Mishra, Exploration and Exca-

vation officer of the H.M.G., Department of Archaeology, in 1966 and 1967 under the general guidance of the author), and briefly by a Japanese team of the Rhisso University of Tokyo under the leadership of Professor Kuba, in 1967, under a five-year agreement with the H.M.G.

The excavations by the Indian and Nepalese agencies have revealed traces of a habitation on the site that would easily go back to the sixth century B.C., if not still earlier, on the basis of the find of somewhat degenerate specimens of the well dated Aryan ceramic, called the Painted Grey Ware, showing a time lag, and the circumstantial evidence of the association of the region generally with Buddha who flourished in the sixth century B.C. To an extent this date has been indicated by the carbon date of a charcoal specimen from the site, studied by the Tata Institute of Fundamental Research, Bombay, working out to *circa* 400 B.C. More evidence is at once awaited and called for to clinch the issue. The inferences for the present are at best tentative.

Dr. S. B. Deo in his capacity as Colombo Plan Professor of Ancient Indian Culture at the Tribhuvan University, provided by the Indian Cooperation Mission, carried out two excavations at Hadigaon and Lajimpat, in Kathmandu, in the summer of 1965, yielding evidence of habitation reaching back to the Lichchhavi period at the earliest. Dr. Deo had already carried out excavations at Banjarahi and Paisia, in the region of Lumbini, in the summer of 1964, and undertook explorations in the region to the east of Lumbini, left untouched by Shrimati D. Mitra, and brought to light a large number of archaeological sites in the area.

These excavations by Deo were also joint undertakings of the Indian Cooperation Mission and the Department of Archaeology, and the reports in two volumes are in the press and will be out before long.

The excavations at Banjarahi showed two periods of occupation, the earlier of which was associated and characterized by the Painted Grey Ware, which overlapped with another distinctive ceramic designated as the Northern Black Polished Ware with a date range of 600-200 B.C. The earliest occupation of the site could therefore be assigned to the sixth century B.C., if not still earlier. The excavations at Banjarahi by Deo revealed a complex of brick-built temples, dating back to the medieval period.

Likewise Shrimati D. Mitra's excavation at Kodan in 1961, about 3 miles to the south of Tilaurakot, carried out in the hope of exposing a complex of *stupas*, had resulted in the partial exposure of a complex of medieval temples (8th century), with no relevance whatsoever to Buddhism, for the central shrine is clearly a Siva temple as revealed by the broken remnant of a *linga* in the sanctum.

Early in 1966, the exploration and excavation branch of the H.M.G., Department of Archaeology undertook under the author's guidance the first excavations by an all Nepal team at Dhum Varahi, on the northern outskirts of Kathmandu, and found the remains of a late Lichchhavi occupation on the site, comprising among others numerous specimens of terracotta art including, moulds of artistic scenes, inscribed seals, vessels serving as measures of liquids in terms of 5 *prasthas* (pathis), and uniquely the figure of a terracotta camel, dating back to about 7th century A.D.

(*iii*) *Conservation of Ancient Monuments and Remains*

(a) Repairs to Monuments

The machinery of conservation of ancient monuments is vested in the *Guthi Jirnoddhar Tatha Prachin Smarak Samrakshan Samiti* (Committee for the preservation of Ancient Monuments) of the *Guthi Samsthan*. A large number of ancient monuments has been taken up for conservation during the last two years by this body functioning under the chairmanship of the Director of Archaeology. The funds are provided

entirely by the *Guthi Samsthan* (Religious Endowments).

(b) Chemical Conservation

The initial work of the chemical conservation of the then fading and almost obscured murals in the Picture Gallery Museum at Bhaktapur was undertaken and completed during 1965-66 through an officer of the Chemical Branch of the Archaeological Survey of India at the instance of the Indian Cooperation Mission. Simultaneously two young Nepalese chemists of the Department were trained in the rudiments of the complex and variegated work of chemical conservation in general. At the same time similar work of clearing and preserving the colourful murals at the Kumari Ghar was also commenced by the Indian chemist with the help of his Nepalese colleagues. Subsequent work by the trained chemists working on their own at the Kumari Ghar and Hanuman Dhoka have won them laurels.

(iv) Inscriptions and Coins

The Department has been collecting estampages of inscriptions and copies of copper plate grants and inscriptions, in various languages, though predominantly in Sanskrit, and in the Brāhmi and Devanāgari scripts in their many ramifications, as these form a very substantial record for reconstructing the history of Nepal. The work is being attended to mainly by the two epigraphists in the employ of the Department. Among the scholars who have made substantial contributions in this direction special mention may be made of C. Bendall (Great Britain), Sylvain Levi (France), Bhagwan Lal Indraji (India), Buehler (Germany), R. Gnoli (Italy) and groups of Nepalese scholars, including those belonging to the *Itihāsa Samśodhana Maṇḍal*, besides Dr. D. R. Regmi, Yogi Narahari Nath, Shri Hemraj Sakya and Shri Sankarman Rajbanshi (the last two being officers of the Department).

The earliest inscriptional records in the *Tarai* are the pillar inscriptions of Asoka at Lumbini and Nigali Sagar, dating back to the middle of the third century B. C. But the earliest inscription in the Kathmandu valley is the Changu Narayan inscription of Manadeva dated to 384 *Samvat* (A. D. 466). As to coins, the earliest ones discovered so far comprise the punch-marked coins of copper found in the excavations at Tilaurakot followed by the coins of the Pañchāla Kings (2nd century B.C.) and of the Kushans (1st 2nd centuries A.D.). The earliest coins found in the Kathmandu valley are the Mananka coins of Manadeva, dated to 5th century A.D.

The Numismatist of the Department who is currently in charge of the coin museum at Kathmandu had his training at the Banaras Hindu University.

The facts that coins receive specialised attention from the Department has been mentioned in connexion with museums elsewhere in these pages.

(v) Iconographical and Architectural Survey

One of the most interesting works to be undertaken in the field of archaeology in recent years was the comprehensive survey of Nepalese sculptures in the Kathmandu valley, in stone, wood and bronze, made by Shri K. Deva, now Director of the School of Archaeology in the Archaeological Survey of India, under the joint auspices of the H.M.G. and the Indian Cooperation Mission, in 1963. The report is under preparation.

More recently a beginning has been made in making a comprehensive survey of sculptures and architectural remains with an eye on their preservation and study.

The art of Nepal has engaged the attention of scholars from the very beginning of Nepal's contacts with scholars from outside the borders, but it is only now that the study is gaining in momentum, as the contacts and mutual exchanges

have become closer. It was Professor Stella Kramarisch who first wrote a comprehensive though inadequate book on the *'Art of Nepal'* (1964). This was followed by the Department's own publication of a catalogue entitled *'Nepalese Art'* (1966). Objects of art from Nepal have been exhibited in recent years over a large part of the globe including several countries in Europe and Asia under the auspices of the Department and a roving exhibition from Nepal will be shortly on display at the International Exhibition of Art in Mexico to coincide with the forthcoming (19th) Olympic Games.

(*vi*) *Museums and the control of traffic in Antiquities*

The Department has presently seven museums under its control, namely the Nepal Museum and the Coin Museum at Kathmandu, the Archaeological Garden-cum-Museum and the Museum of Excavated Antiquities at Patan, the Picture Gallery and Woodworks Museum at Bhaktapur, and the Archaeological Site Museum at Taulihawa (Tilaurakot-Kapilavastu). Of these the Nepal Museum, which is the oldest museum in Nepal and also the national museum and covers several other aspects besides archaeology, was founded in 1928. The first two successive keepers of the museum were Shri S. N. Sen and Shri Benode Bihary Bhattacharya, respectively. These museologists, both from India, contributed considerably to the museum movement in Nepal in general and to the building up of the nucleus collection of what has now become the National Museum.

It is comforting to record that the export of antiquities from Nepal is prohibited by the law of the land and the control of and vigilance over the movement of the antiquities has been presently entrusted to the authorites of the National Museum of Nepal.

(*vii*) *Research and Publications*

The reports of the various works carried out by Indian archaeologists are mostly ready, and some are in the last stages of printing in the press.

The Department itself has started its own bilingual journal entitled *Prachin Nepal* (*Ancient Nepal*), that comes out once in three months since October '67. Three issues have already come out and the fourth is in the press.

One of its attractive publications is a catalogue of Nepalese art objects entitled *'Nepalese Art.'* It was prepared on the eve of the organization of the roving exhibition of Nepalese art objects, first held in Paris, in October 1966, that has been going round the world during the last two years.

The Department has also published four books on the palaeography of the different scripts used in Nepal, besides a list of inscriptions collected from Bhaktapur, with the essential parts of the inscriptions adequately abbreviated.

(*viii*) *Organizational, Training and Miscellaneous Works*

One of the first archaeologists to be formally invited by H.M.G. in recent times, in 1961, to suggest ways and means for the proper organization of the Department was Shri A. Ghosh, then Director General of Archaeology in India, under the auspices of the Indian Cooperation Mission. Shri Ghosh's visit paved the way for (a) the first prehistoric expedition in the valley by Dr. R. V. Joshi (1961), (b) excavations at Lumbini and Tilaurakot by Shrimati D. Mitra and the exploration of the region to the east of Lumbini (1961), (c) the iconographical survey of the sculptures of Nepal under Shri K. Deva, (d) initiation of chemical conservation in Nepal, (e) training of the entire technical staff of the Department comprising a draftsman, a surveyor, an engineering officer for archaeological conservation, an Epigraphist and an iconographist, respectively, in the different lines of their work at the various relevant offices of the Archaeological Survey of India, besides, (f) the supply of a large number of books by the Indian cooperation Mission towards building up the essential nucleus of a research library of the

Department. Shri Ghosh also submitted a general organization and developmental plan for the Department, which has been gradually implementing.

In addition to the training of technical staff and officers mentioned above, an officer of the Survey has successfully undergone the (nearly) two-year Diploma course in Archaeology at the School of Archaeology of the Archaeological Survey of India, and three of the museologists of the Department have received training at different time in the course of Museology at the Department of Museology at the Baroda University under a Colombo Plan Scheme of scholarships offered by the Indian Cooperation Mission. This trained personnel represents the present and future hope and mainstay of the Department's manifold activities that are under way.

(*ix*) *Archaeological Advisers*

The Department also secured the services of an Unesco Adviser for Archaeology for a year in 1964-65, and, on the expiry of his term, a senior officer of the Archaeological Survey of India was appointed under the Colombo Plan of the Indian Cooperation Mission to work as Adviser to H.M.G. for Archaeology, in April 1966. The present adviser has been throughout associated actively with all aspects of the Department's work, comprising exploration and excavation, conservation of ancient monuments, preparation of a catalogue of Nepalese Art, publication of the Department's own Bulletin entitled *Ancient Nepal*, collection of data on monuments and sculptures, and preparation of excavation and technical reports, besides undertaking research on diverse topics, and the continued training of technical hands in their respective fields during the last two and a half years.

In recent months the Department has also been enlisting in addition the services of short term experts on museums, conservation of monuments, cultural tourism and chemical conservation etc. from the Unesco.

(*x*) *Development of Lumbini*

It is admitted on all hands that the world-famous site of Lumbini with the temple of Maya Devi, ruins of the monasteries and *stupas* that once hummed with activity in the vicinity of the hallowed spot of the birth of Buddha, in the midst of what was then a garden, with the ancient village not very far removed from the site, would lend itself to considerable improvement towards revival of its ancient glories.

The 6 mile long motorable road that connects Lumbini with Kakrahawa on the Indian border, leading on to Naugarh Rly. Station in District Basti, Uttar Pradesh, was built by India in 1956, and made over to the H.M.G. in 1958. It was then and is even now an essential means of communication used by large numbers of pilgrims and tourists visiting the site from the Indian side.

Conclusion

It would be clear to see that though much has already been achieved by the young Department of Archaeology, during the very short time of its existence, a great deal remains yet to be done. The task lying ahead of us is simply enormous and staggering by its very nature. It would be at once the envy and pride of even the most well-organized and advanced archaeological institution in any part of the world, for the challenge posed by the task and its myriad facetted problems is irresistible.

Apart from the Nepalese themselves, many hands from the different countries of Asia and Europe, including, though on a much smaller scale, some from the United States also, have joined in the none too large endeavour to uncover the various aspects of Nepalese history and culture.

Discovery of Lithic Artifacts in Jammu Area

by G. C. MOHAPATRA and HARI MOHAN SAROJ

The region of Jammu was a *terra incognita* as regards prehistoric cultures till a press report in August 1966 announced the discovery of a few Sohanian pebble-tool sites from the Ravi valley in the Kathua district[1]. Previously from Kangra district in Himachal Pradesh adjoining Jammu, not only similar pebble tools but also a large number of small flake-tools and Neolithic polished stone celts had been discovered which revealed a fairly coherent picture of the development of lithic cultures in that region[2]. The exciting new discovery from the Ravi valley provided a very encouraging lead to search for the extensions of these prehistoric cultures in the region of Jammu, the low hilly areas of which present almost identical physiographical and geological features as that of the Kangra district. This note presents the first set of results of the field investigations carried out by the junior author in connection with a research scheme "Lithic Industries of Jammu" conducted under the supervision of the senior author.

Explorations in the valley of the Ravi and its tributaries like the Ujh, the Tarnah, the Ben and the Basantar ; and the Tawi, a tributary of the Chenab, have yielded artifacts of two lithic industries namely, the Early Sohan and the industry of the small flake-tools. The former industry occurs on high river terraces at Nagrota on the Tawi (Dist. Jammu), Kuta on the Ben (Dist. Kathua), Drui on the Basantar (Dist. Jammu), Dyalachak on the Tarnah (Dist. Kathua) and Jandore on the Ravi (Dist. Kathua), whereas the latter industry was found also on the terraces at Rajbagh on the Ujh (Dist. Kathua) and along with the former at Kuta and Dyalachak.

The Sohanian pebble-tools display the traditional technique and typology as are peculiar to this culture. But one specimen, a unifacial pebble-tool, is exceptionally interesting (Pl. I, fig. 5), Its pick-like form is a distinct departure from the chopper-choppig tool typology. All the flakes removed, from one face of the elongated flat pebble, were primarily aimed at reducing the thickness of the edges and one end of the pebble to a thin tip like that of a handaxe. The other end retains the whole of the pebble cortex as seen on many of the smooth-pebble-butted handaxes of the peninsular variety. Another feature, which is alien to the Shohanian tradition, is the multi-directional flaking technique. The flakes which have been struck off from both margins, bottom upward, of one surface only, ultimately converge at the tip. This extensive flaking covering nearly three fourth of the total area of one surface has produced a sharp working-edge around more than half of the periphery of the pebble and has made the tool pyriform. Although a hundred percent pebble-tool, this specimen is distinct from the Sohanian pebble-tools due to the above typo-technological peculiarities. Those who are acquainted with the lithic cultures of the north western part of the Indian subcontinent will not fail to appreciate the significance of this specimen because howsoever faint, this provides a clue which when carefully followed might help us in settling the long drawn controversy about the presence of handaxe-cleaver culture in this part and its relationship with the Sohanian.

The small flake-tools prepared out of the siliceous raw materials display advanced techniques as are found in the Middle Stone Age indus-

tries of India. The flakes, usually struck from the prepared cores, have been dressed into various types of scrapers. There are a few small and flat chert pebbles also dressed into scrapers which look like miniature pebble choppers due to the unifacial and one directional flaking so typical of the Sohanian. The character of this industry in Jammu compares well with that of the small flake-tool industry found in Kangra district [3]. It is too premature to comment on its exact relationship with the peninsular lithic culture complex.

The results of this preliminary field investigations in Jammu when interpolated into the data previously obtained from Kangra, combine these two regions into one cultural unit and emphasise its vast potentiality for future fruitful research.

NOTES

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PLATE I

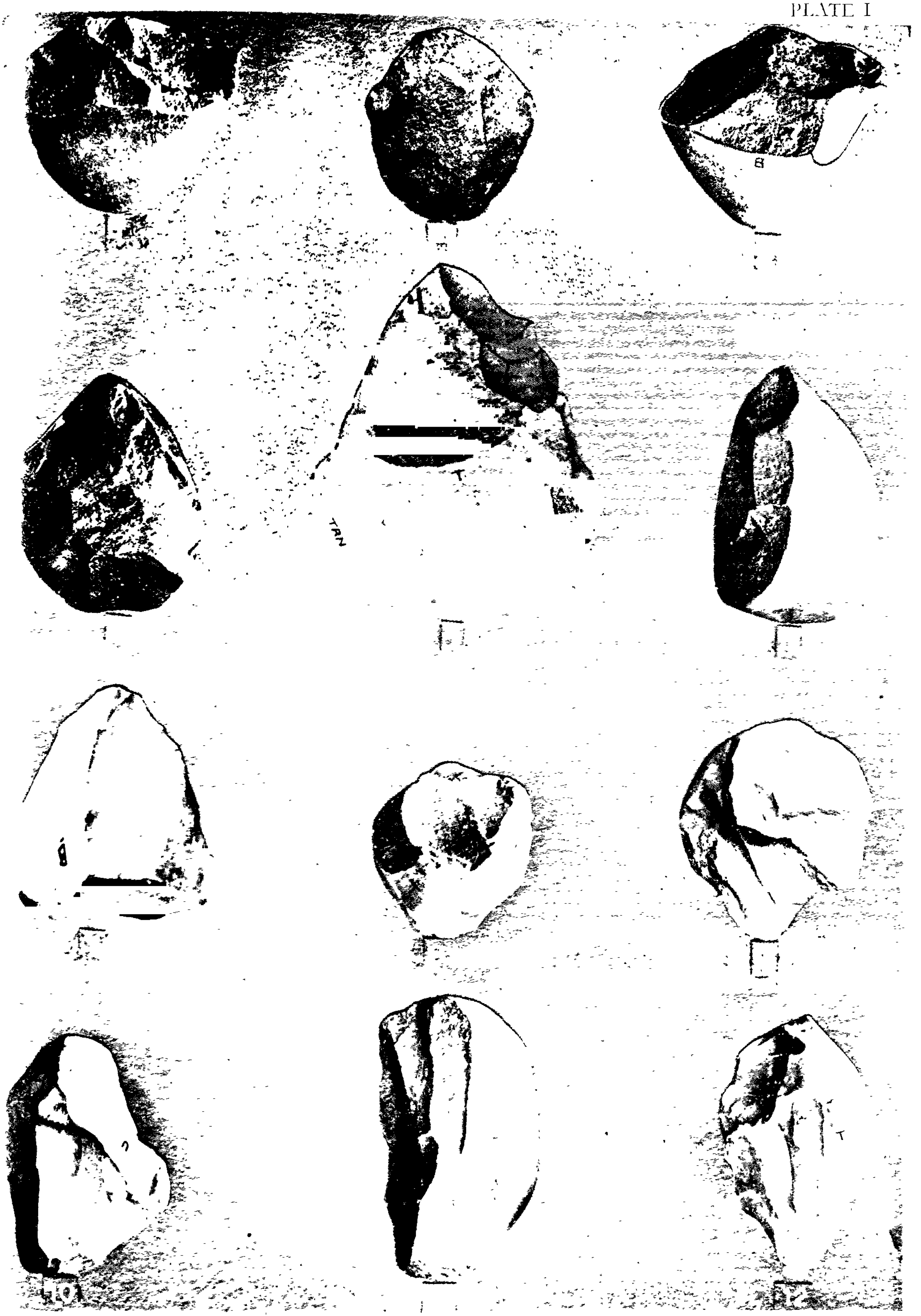
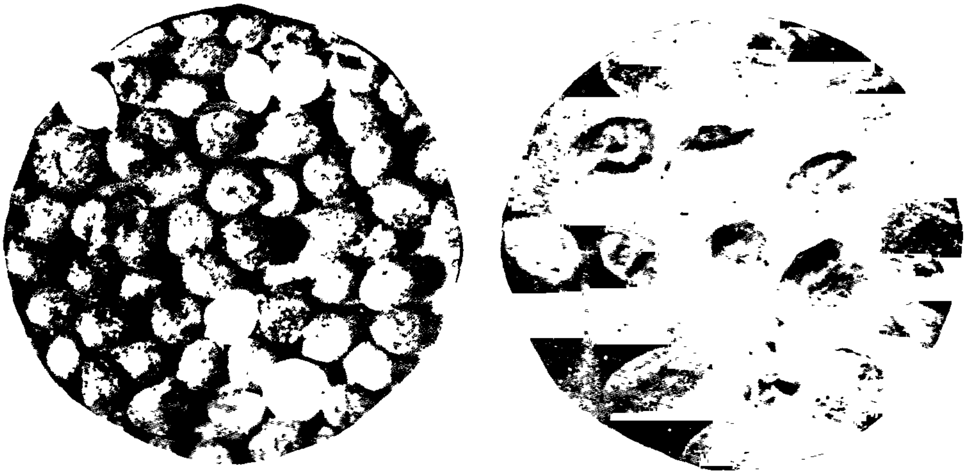


PLATE II



1 2

A. 1— Carbonised grains of *Sorghum* sp. x 4 from Bhatkuli. The white seeds are of modern *Sorghum* sp. 2—Carbonised seeds of *Cicer arietinum* x 2.

B. Fossil-bones from a pit on the Purna, western Maharashtra.

Regional Variations in the Indian Middle Stone Age Culture with Special Reference to Nalgonda in Andhra Pradesh

by S.N. RAO

The Indian Middle Stone Age as a separate cultural entity characterised by a large group of diminutive flake tools has been fairly well established after the discovery of the Nevasian Industry by Sankalia in 1954 in a distinctly stratified horizon. This culture occupies the intermediate position which was preceded by the Early Stone Age and succeeded by the Late Stone Age. Broadly it covers the period from the end of Middle Pleistocene and continues in Upper Pleistocene including the earlier part of Holocene. Since the discovery of the Nevasian culture a number of sites showing similar cultural evidence have been reported from the sub-continent. [1].

Sankalia observes that "in a vast country like India there are bound to be regional variations (in the Middle Stone Age Culture) attributable to ecological, geographical and other factors". So, keeping this point in view, an attempt is made here to bring into focus the diversities that are evident in the industries of the Middle Stone Age culture from various regions in India in general and Nalgonda in particular.

The archaeological record of the Indian Early Stone Age period stretching over a great span of time shows a general uniformity of method of manufacture and form of stone implements in time and space.

The succeeding Middle Stone Age heralded a new phase of cultural trend resulting in several regional manifestations and yet all displaying certain dominant common cultural traits.

There was general switch-over in the choice of raw material for obtaining flake tools during this period, preferring such fine-grained silicious minerals like chert, jasper, agate and chalcedony as is evident in the industries from Andhra (Asifabad) [2], Maharashtra (Nevasa) [3], Rajasthan [4], Madhya Pradesh (Narmada Valley) [5], Northern Bundelkhand [6] and Orissa [7]. That the flake tools were made not only on silicious materials but the same quartzite of fine-grained variety was continued to be chiefly favoured in this period as in the Early Stone Age is clear from the industries of such sites as Kurnool [8], Cuddapah [9], Chittur [10] in Andhra, Sirsa Valley in the East Punjab, and Upper Soan in Pakistan [11].

A significant achievement in this phase was the technological progress explicit in the predominance of the production of flakes and flake-blades from cores previously prepared to get tools of desired shape and size, a technique which was economical both of labour and of raw material. The preparation of either core or striking platform or both can be observed in these industries. Fluted core method was also prevalent to some extent. At the same time most of the flakes were infact obtained from cores without previous preparation or by "plain" flaking technique. These stone techniques were employed either individually or together at different sites. In the industries of Nevasa and Kurnool, Rajasthan,

Narmada Valley, Northern Bundelkhand and the Upper Soan a few flakes and cores (increasingly in the Upper Soan 'B') show previous preparation of striking platform and of core recalling the Levallois technique. The knowledge of previous preparation of core and striking platform is unknown in the industries of some areas like Orissa and the plain flaking cylinder hammer technique was continued throughout. Though rare, the fluted core method was evidently used for the manufacture of blades along with the above mentioned stone techniques. This feature is seen in the Middle Stone Age industries of Damoh Area [12], in Madhya Pradesh and Northern Bundelkhand, some of them occurring in the stratified deposits and others from the factory sites.

Typologically the tools of the Middle Stone Age culture show some distinct diversities. Some characteristic tool types like scraper, borer and point repeatedly appear in all the industries. Biface or handaxe,cleaver and chopper of diminished size, the typical tool types of the Early Stone Age industries of the areas like Chittur (Andhra) Rajasthan, Northern Bundelkhand and Upper Soan. The occurrence of burin as a definite tool type of this culture is a matter of controversy though they are reported from Orissa and the Narmada Valley.

So far as the size of the tools are concerned those of Kurnool, Rajasthan, Northern Bundelkhand, Sirsa Valley and Upper Soan A are comparatively larger than the diminutive artifacts of other regions.

The Middle Stone Age culture in most of the regions led to the development of the Late Stone Age culture of microlithic facies whereas in Kurnool and Chittur in Andhra it gave rise to "blade and burin industry", typical of the European Upper Palaeolithic traditions.

In Nalgonda district [13] of Andhra Pradesh, where I carried out a systematic survey for the evidence of prehistoric cultures from 1962 to'65, the Middle Stone Age culture shows the following industrial elements and variations.

Stratigraphically the *in situ* implements of this industry occupy the gravel II of the second aggradational cycle, succeeding the Early Stone Age industry of the basal or first gravel horizon. A bulk of the artifacts are found in an unrolled condition at the factory site of Ramatirthampaya.

This industry comprising 589 artifacts is broadly classified into two groups based on the following criteria:

(A) the technique

(B) the size of the artifacts, and

(C) the raw material.

The group I implements are characterised by the widespread use of 'plain" flaking cylinder hammer technique and none of the flakes show the evidence of previous preparation either of striking platform or of upper surface. Another distinguishing feature of this group is the size of the tools which are relatively larger than their counterparts in group II. Lastly, they are exclusively made on medium-grained quartzite of various shades.

Flakes and flake-blades of group II are distinguished by the extensive use of 'prepared' core technique, the backs of which generally retain a series of flat and convergent flake scars. Knowledge of fluted core technique is obvious on the Middle Stone Age industry of Nalgonda as a few blades and fluted cores are found in association with the flakes of this industry at the workshop at Ramatirthampaya. They are made of the same material, that is, fine-grained quartzite of grey colour and are in the same physical condition as the rest of the artifacts which are stained to deep brown colour as they lay on brown sandy soil. In contrast to the implements of group I, those of group II are marked by their diminished size.

The implements of both the groups exhibit retouch and marks of use in different regions.

They are placed into two divisions according to the shape and the character of the working edge with no attempt at suggestion as to their use [14].

A. Single tools

B. Multiple tools

The tool types in both the groups are identical and these are as follows:

Single tools: 1. straight edge, single or double, 2. convex edge, 3. concavo-convex edge, 4. notched, 5. pointed and 6. discoidal.

Multiple tools: In this, a combination of any two types of working edges, as mentioned above, can be found on a single specimen to serve dual function.

These tools are comparable with their counterparts in the industries of other areas bearing such functional terms like scraper, borer, point and scraper-cum-borer.

The biface, cleaver and burin types are lacking in this industry. This is replaced by the Late Stone Age of non-geometric microlithic facies.

Thus the Middle Stone Age industry of Nalgonda, while basically showing a common cultural pattern, essentially differs from the industries of some regions and closely corresponds with some others in certain industrial elements.

The continued dependence on quartzite as raw material as well as the survival of chopper, hand-axe and cleaver types in this culture as in the Early Stone Age indicate a relationship between the two cultures. The variation in the choice of the raw material was primarily due to non-availability of silicious minerals in the areas of quartzite using industries.

The progressive technological change revealed in the tool equipment of the Middle Stone Age folk is at best a reflection of the adaption to the changed environment and the variations in this regard were presumably conditioned by local genius and relative isolation of each group of people from the mainstream of cultural contacts.

The survival of old tool types in some of the Middle Stone Age industries even at a time where there were substitute types, is largely attributable to the conservative attitude of the people who were reluctant to give up old methods and forms that had been in vogue for centuries.

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Some New Fossil Discoveries from Western Maharashtra, India

by S. N. RAJAGURU

During the last four years the author had an opportunity to explore some parts of the upper reaches of the Godavari, the Bhima and the Krishna rivers in western Maharashtra. On many of his field trips he was fortunate to have the company of eminent scholars like Prof. H.D. Sankalia, Dr. G.G. Mujumdar, Dr. Z.D. Ansari and Dr. Mrs. Corvinus of the Deccan College, Poona. They have the lion's share in these discoveries. The fossils collected from the Dam sites would not have seen the light of the day if the authorities in charge would not have taken interest in our work and provided the necessary facilities. The main purpose of writing this note is to bring all these discoveries in a more coherent way and to attempt to interpret the data collected.

After the initial discoveries of animal fossil bones in the alluvial deposits of the Godavari and the Krishna by geologists and palaeontologists like Twemlow, Cook, Pilgrim (1905) and others, these deposits were mostly dated to the Pleistocene period. The fossil bones discovered by them belonged to species like *Elephas Namadicus*, *Bos Namadicus*, *Hippopotamus palaeinducus*, *Equus Namadicus* etc. Later on Sankalia (1943-1964) systematically studied the alluvial deposits of various streams in the W.Maharashtra and his findings of the archaeological materials in association with *in situ* fossil bones especially that of *Bos Namadicus* at Kalegaon in the Godavari could help him in sub-dividing Stone Age cultures and also Pleistocene period itself. During this period the various exposed tool bearing deposits in association with the fossils mentioned above were dated to Middle Pleistocene. Later on after the detailed study of the fossils from the older alluvium of the Narmada by Khatri (1962) and on comparative analysis he thought that *Bos Namadicus*, found in association with Middle Stone Age tools in the Godavari, is a late survival of the Middle Pleistocene times and the dating of the archaeological material goes to Upper Pleistocene. Thus two main aggradational and erosional cycles more or less got established in many of the streams of Maharashtra and the Early Stone Age industry belonging to 1st aggradational cycle and the Middle Stone Age industry belonging to the 2nd aggradational cycle were dated to Late Middle Pleistocene and Upper Pleistocene respectively. Recently Joshi (1966) found a jaw of *Bos Namadicus* along with large number of very neatly worked handaxes, cleavers, etc., in a sandy pebbly gravel of the Godavari near Gangapur in Dist. Nasik and he dated the Early Stone Age industry of Gangapur to the Middle Pleistocene.

The new fossil discoveries are mainly from the Pleistocene deposits of the Godavari (near Paithan), the Mula (near Baregaon Nandur) in Dist. Ahmednagar, the Purna (near Yeldari) in Dist. Parbhani, the Ghod (near Kalamb and Chandoli) and the Mula-Mutha (near Bhivari) in Dist. Poona. All these sites, excepting Chandoli, have yielded *in situ* fossil bones in the Pleistocene deposits. The dam excavations at Paithan, Rahuri and Yeldari provided us an excellent opportunity to collect materials from the fre-

shly exposed, uncontaminated sedimentary horizons. The exact location of the site, its geological and archaeological context and the possible identification of the fossil species etc., have been given below.

1. R. Godavari at Paithan

On the right bank of the Godavari, a fossil bone along with a few Middle Stone Age tools was collected from a sandy pebbly gravel exposed during the excavation for a dam construction. The location of the deposit was about 1km. away from the present Rt. bank of the stream and was 7m. above the present bed level of the stream. The alluvium buried below the modern bed is between 3 & 6 m. There is a clear cut evidence of the shifting of the Godavari from south to north. The fossil bone belongs to the Sp. *Bos.* The author feels that the fossils discovered by earlier workers at Paithan should also belong to Middle Stone Age.

2. R. Mula at Baregaon Nandur

Site A—A huge cut off trench on the right bank of the Mula was taken for the construction of a dam. The trench had exposed an alluvium, about 40 m. deep and 800 m. laterally extended from the right bank. The upper part of the alluvium (i. e. first 10 m. from the surface) was comparatively fine grained and was essentially sandy and silty while the lower part was coarse grained and contained large number of lenticular bodies of pebbly and bouldery conglomerates. Two unrolled fossil bones and fragmentary pieces of fossil wood (semi-carbonized) were collected *in-situ* from the sandy pebbly or bouldery gravels generally occuring 10 m. below the present bed level of the Mula. All these fossils occurred in a lateral distance of about 200 m. No cultural material was found in association with these fossils. Only in the top-most portion of the alluvium (15 m. above the level of fossil bearing stratum) a few Middle Stone Age tools were noticed. In the Mula also there is a clear cut evidence of shifting of the course of the stream from south to north. The identification of fossils is as follows:

(a) A left horizontal ramus of mandible with some teeth of *Bos Namadicus* Falconer.
(b) A horn of *Bubalus bubalis linnaeus.*
(c) The wood pieces resemble *Terminalia Arjuna* in anotomical characters. These semi-carbonized samples have been dated by C-14 method to about 33,000 yrs. B.P.

Site B—In the spill-way excavation on the left bank of the Mula two more fossil bones were found in the sandy pebbly gravel. Culturally only one genuine Middle Stone Age flake on chert was found in the same gravel horizon which occurred 3 m. below the present bed level of the Mula. The fossil identification is :

(a) Jaw of *Bos namadicus* with a few teeth.
(b) Fragmentary pieces of a tusk of *Elephas.*

The Mula meanders quite widely in this area and from the geomorphological evidence it appears that the pre-depositional channel of the Mula was about 14 to 17 m. below the present bed level and the shifting towards north has occurred in comparatively recent times. The present course of the Mula has exposed only 12-15 m. of the alluvium and has yielded good number of Middle Stone Age tools near Baregaon Nandur.

3. R. Purna at Yeldari

During the dam construction on the Purna, a tributary of the Godavari, a pit, 20 m. deep and 8 m. wide (longitudinal extent unknown) filled with alluvium, was found in the otherwise rocky bed of the Purna. This pit, probably a local gorge formed naturally, served as a natural pit-fall for the animals. We could collect large number of practically unrolled bones of an elephant along with some rolled bones of other species in the basal coarser gravel of the pit (Plate IIB). Unfortunately, no archaeological material was found in association with these bones.

These bones have been identified as follows:

(a) Fragment of cheek tooth of *Stegodon Insignis* Falconer and *Cautley*.

(b) Fragment of cheek tooth of *Elephas hysudricus* Falconer and *Cautley*.

(c) Fragments of mandible, distal fragment of left humerus, of tibia, proximal fragment of left humerus and large fragments of tusk of an *Elephas*. (Probably all these and others unidentified bones belong to one elephant).

(d) Distal fragment of right femur of *Bos*.

4. R, Ghod at Kalamb and Chandoli

Both these places are situated about 64 km. NE of Poona, on the left and right banks of the Ghod respectively, the latter place is little downstream of the earlier one. At Kalamb an *in-situ* fossil shoulder bone probably of *Elephas hysudricus* was recovered from a very well cemented sandy pebbly gravel exposed in the bed of a stream. The gravel rests directly on a basaltic rock and is overlain by finer sands and red brown kankary silt. No cultural material was found in association with the fossil bone. While at Chandoli a large number of fragmentary pieces of tusk, along with a few Middle Stone Age tools, were collected from a talus deposit accumulated at the foot of the cliff composed of ancient alluvium. The maximum basal girth of one of the largest and intact piece of tusk came to about 65 cm. and the total weight of all the pieces was found to be 63 kg. The average basal girth of the tusk of a modern Indian elephant is about 50 cm., while it had been found to be about 56 cm. in the case of *Elephas namadicus* found in the ancient alluvium of the Godavari. From all these considerations the tusk found at Chandoli appears to belong to some extinct species of an elephant.

5. R. Mula-Mutha at Bhivari.

About 32 km. east of Poona, a fragmentary bone of *Bos* and a distal fragment of a right radius of a *Bos* were found in a lenticular patch of a sandy pebbly gravel occurring in the yellow brown kankary silt which had formed a cliff on the left bank of the stream. The gravel was 5 m. above the bed level of the stream. A few Middle Stone Age tools were found in association with these bones. Besides these *in-situ* fossil bones, a large number of bones have been collected from the modern bed of the Pravara at Nevasa and a few from the Godavari, Ghod and the Bhima proper. The river Krishna has so far not yielded any fossil bones. All these loose fossil bones have been excluded from this note as they are out of any context.

Discussion

The number of these *in-situ* fossil bones found in the W. Maharashtra is quite small when compared with fossil finds in the central Narmada and in the Belan, a southernly tributary of the Ganges in Uttar Pradesh. But when we consider the general paucity of palaeontological material in the ancient alluvial deposits of the streams of the Peninsular India and especially of the W. Maharashtra—then these *in-situ* findings in the general context of geomorphological history of the region assume a great importance.

So far either in the Narmada or in the Godavari, the similar fossil species have been found in association with Early and Middle Stone Age tools, and hence the use of palaeontological material for dating cultural assemblages has become very limited. The fossil bones found at Paithan, spill-way fill of the Mula, Chandoli and at Bhivari are more or less associated with the Middle Stone Age tools. All these fossil species are definitely extinct and naturally the Middle Stone Age tools, from the gravel associations, are therefore not likely to be of Holocene period. In the light of the cultural development throughout the Old World the comparable industries like Middle Palaeolithic of Europe and Middle Stone

Age tools from Africa do not date to a period earlier than the early Upper Pleistocene or Last Interglacial. So naturally the Middle Stone Age tools in this context at least can not be earlier than Last Interglacial. However, if we accept the C-14 date from the Mula the whole filling is not likely to be older than 50 to 60 thousand years at the most, as the dated sample comes from almost the basal portion of the old alluvium. The Middle Stone Age tools in the Mula, the Pravara and the Godavari have been found in the more or less same geomorphological context and hence they can be dated to later part of the Upper Pleistocene.

There are very few Early Stone Age sites, occurring in stratified context in the W. Maharashtra. The sites of Gangapur on the Godavari and of Nevasa on the Pravara are perhaps the only best preserved evidences. At Gangapur the tool bearing horizon is slightly above the bed level of the Godavari while at Nevasa the boulder gravel of Hathi-Well is fast eroding and many times Middle Stone Age tools have been collected along with Early Stone Age tools from it. At Barod Garden, about 20 m. higher than the boulder gravel at Hathi-Well, again a mixed assemblage of Early and Middle Stone Age tools have been collected. It is only at Chirki, about 1½ km. down-stream of Nevasa, recently Corvinus has discovered and unearthed the camping cum workshop site of Early Stone Age man on the right bank of the Pravara. Here the level goes to a height of about 5-6 m. from the bed level of the Pravara and the Early Stone Age tools almost in mint condition and in all stages of manufacture have been found to occur in a thin rubble deposit resting on a rolling rocky surface. The Middle Stone Age tool-bearing alluvial gravel of varying thickness covers the rubble deposit. Thus the only well preserved sites of the Early Stone Age are at Gangapur and at Chirki-Nevasa. Technologically some of the tools are extremely well made and the use of the prepared core-technique is also not rare. The tools have been fashioned out of even bad raw materials. All these things suggest that the Early Stone Age man was technologically quite advanced. How old this advanced Early Stone Age industry of W. Maharashtra can be ?

It can not be earlier than the Middle Pleistocene if we consider the association of *Bos Namadicus* at Gangapur. But the *Bos Namadicus* occurs in association with the sample, dated to 33,000 B.P. in the Mula. Geomorphologically it has been found that the Godavari and its tributaries like the Pravara and the Mula were flowing at much lower level and more towards the south of the present course in the pre-depositional phase. The dating of this major erosional phase is not certain but can not be much earlier than Middle Pleistocene as the lowermost buried deposits have only preserved Middle Pleistocene fauna. Whatever may be the date of this early erosional phase, we can say, if only on the basis of faunal evidence, that the filling of these streams started in Middle Pleistocene. But in the light of the C-14 date the whole aggradational phase in the Godavari basin is likely to be of Upper Pleistocene only. In that case the Early Stone Age industry of Gangapur is more likely to date to Upper Pleistocene only. At Chirki, early man seems to have occupied the rocky plain at a time when the Pravara had just begun to fill its channel. If he would have been there earlier, the tools could have easily washed down into the valley because of the erosional phase of the streams. The cultural assemblage could get preserved in such a fine condition on a bare rolling rocky plain by the side of a river probably because it got sealed up by Middle Stone Age tool bearing channel without involving much time-gap between these two stages. All these points suggest that the occupation of the Chirki area was only in the earlier parts of the aggradational phase and there was not much time gap between the Early and Middle Stone Age traditions. If our dating of Middle

Stone Age tools to later part of the Upper Pleistocene is correct then it will not be very wrong if the Early Stone Age tools are placed in the early part of the Upper Pleistocene in the W. Maharashtra.

The dating of such advanced Early Stone Age industries to Upper Pleistocene in the Lower Narmada (Wainwright, 1964), in the Central Narmada at Mahadeo Piparia where Middle and Early Stone Age tools have been found together in the boulder conglomerate (Supekar, 1965), thus gets confirmed from the evidence obtained from W. Maharashtra. The Late Acheulian of sub-Saharan Africa (Clark, 1964), the Barda Balka Middle Palaeolithic of Iraq (Braidwood, 1960), and the Upper Stellenbosch—Late Sohan complex of West Pakistan (Paterson, 1962) have also been dated to the Upper Pleistocene and purely on comparative studies the chronology of Early Stone Age in W. Maharashtra dates more or less to the similar period.

Thus these fossil discoveries from W. Maharashtra have shown that :

(1) Some of the species which got extinct in Siwaliks in Early Pleistocene could survive almost till the end of the Upper Pleistocene, probably because of the better ecological setting, in the peninsula.

(2) The advanced Early Stone Age industries of Maharashtra are likely to be of Upper Pleistocene period.

(3) Geomorphologically the streams in Maharashtra have experienced considerable changes in their activities of cutting and filling in geologically speaking short time.

Acknowledgements

The author expresses his sincere thanks to Shri M. A. Chitale and Shri Oka of the Irrigation Deptt. Maharashtra state, for allowing to collect fossil bones from the Dam sites of the Mula and the Purana. He is extremely grateful to Shri Bholanath and Prof. T. S. Mahable of the Zoological Survey of India, Calcutta, and Botany Deptt., University of Poona for their palaeontological identifications and to the authorities of the Tata Institute of Fundamental Research, Bombay for C-14 dating of the sample from Mula Dam site.

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Plant Remains From Ancient Bhatkuli, District Amraoti, Maharashtra

by VISHNU-MITTRE and H. P. GUPTA

Introduction

The carbonised plant remains described in this paper have been discovered from Bhatkuli, district Amraoti, Maharashtra State, by Dr. Moreshwar G. Dikshit, the Director of Archives and Archaeology, Maharashtra, who very kindly sent the material to the senior author for investigation. As per personal communication from Dr. Dikshit, the material was discovered from a very preliminary investigation of the site and consequently nothing definite can be said about the age of the material and very likely it should be of early historic period.

The material is highly carbonised and is in the form of brittle blocks of ash and silt containing several food grains. The food grains except those of *Cicer arietinum* L. (chick-pea) are very fragile, but the morphological characters are well preserved. The food grains, recovered by breaking these blocks, are of two kinds, the chick-pea (*Cicer arietinum* L.) and spiklets of giant millet (*Sorghum* sp.). The latter are far more abundant than the former.

Description of Plant Remains

1. GIANT MILLET (JOWAR)

Sorghum sp.

(Plate II A ; Fig. 1)

The carbonised spikelets referred to Jowar are more or less lanceolate or oblong in shape. They measure 2.2 to 4.0 mm. in length and 2.0 to 3.0 mm. in breadth with the proximal side pointed and the distal side rounded. The hilum scar is prominently present on the flattened surface and the area bearing the embryo is prominently marked.

A comparison of the carbonised *Sorghum* seeds with that of modern Jowar seeds has revealed that the Bhatkuli specimens closely resemble in shape those of *Sorghum bicolcr* as described by Bor (1960) [1]. The seeds are, however, much smaller and it may be due to shrinkage owing to charring. *Sorghum bicolor* is extensively cultivated in Bombay and Madras.

2. CHICK-PEA (GRAM OR CHANA)

Cicer Arietinum

(Plate II A; Fig. 2.)

Only twenty-four carbonised gram seeds have been recovered from the material. The seeds are obovate or subglobose in shape and prominently beaked, measuring 5.0—6.0 mm. in length, 3.5—4.0 mm. in breadth and 3.0—3.5 mm. in thickness. The hilum mark is well preserved. Some seeds are provided with wrinkles on the dorsal surface. The carbonised seeds are similar in shape but slightly smaller in size from those of modern chick-pea and this may be due to carbonization.

Discussion

Of the two plant remains discovered from the site the chick-pea (gram) is known for the first time from the archaeobotanical records in India. The remains of *sorghum* are known earlier from the chalcolithic site of Ahar (Vishnu-Mittre, 1968) [2]. The seeds of *Sorghum* from Ahar have been referred to *Sorghum vulgare*, whereas the Amraoti finds seem to belong to *Sorghum bicolor*. Thus *Sorghum* seems to have been known in India since the Chalcolithic period. Its cultural significance has already been commented upon by one of us (Vishnu-Mittre, *loc. cit*).

This discovery of chick-pea from Amraoti being the first record from India adds to our knowledge of the history of Indian cultivated plants. From this evidence alone it is, however, difficult to say that the chick-pea arrived in the country comparatively very late. From literary sources collected by Gode (1945) [3] it appears that it was chiefly used to feed horses from 800-1300 A.D., and chick-pea arrived in India together with the Persian and Arabic horses. Its use as food for horses in Kashmir is attested by *Rājtaranginī* but *Charaka Saṁhitā* mentions chick-pea as an article for food for human consumption amongst the Dhanyas.

Vavilov (1951)[4] believes that the western In-

dia is a part of the centre of origin for chick-pea. It seems that the chick-pea was domesticated in north-west India and later diffused into the other parts of the country. If the Persians or the Arabians should be held responsible for its introduction and diffusion into the country then their possible routes might have been either through the north-west India or through the Thana Coast in Bombay which had an important port for exchanges between West Indians, Egyptians, Phoenicians, Babylons, Greeks, Persians and the Arabic people. It is hoped that the continued researches in Archaeobotany in India will eventually establish if chick-pea has really been a late arrival in the country or has been known in India since the ancient times.

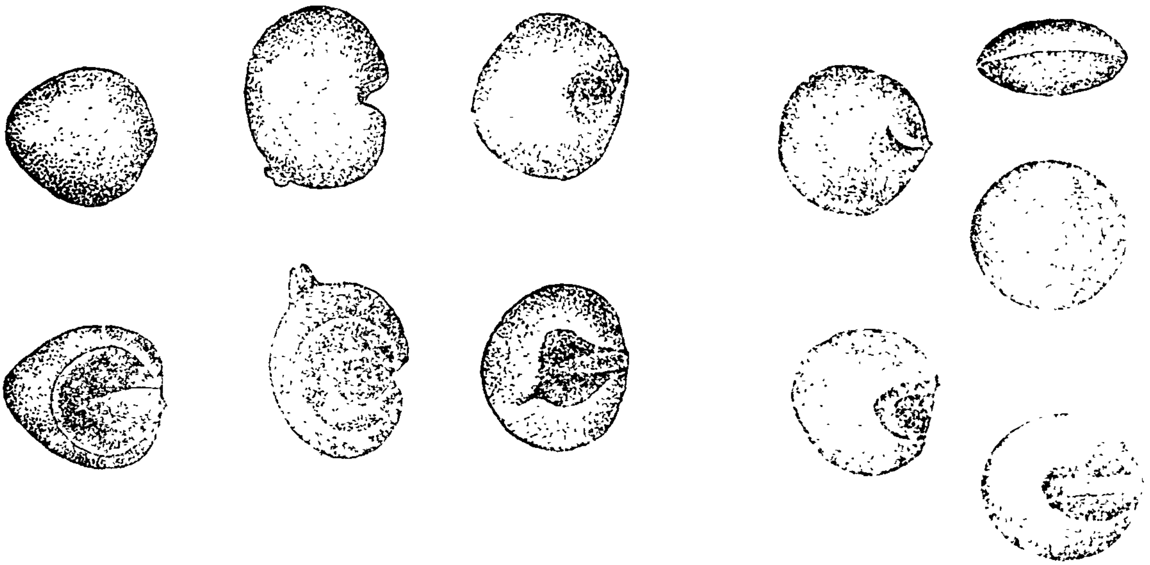


Fig. 1. Carbonised seeds of *Sorghum* sp. shown in different views X 7.

Fig. 2. Carbonised seeds of *Cicer arietinum* shown in different views X 4.

NOTES

[1] N. L. Bor, *The Grasses of Burma, Ceylon, India and Pakistan.* I, Oxford, London, New York, Paris, 1959.

[2] Vishnu-Mittre, 'Plant Economy in Ancient Ahar, Rajasthan.' in '*The City of Tambavati*' by H. D. Sankalia, Poona, 1968.

[3] P. K. Gode, 'Studies in the hisory of Indian plants—History of Canaka (gram) as food for horses between A.D. 800 and 1870 together with some notes on the import of foreign horses into ancient India in Medieval times', *Ann. Bor. Inst.* 26 (1—2), 1945, 89-105.

[4] N. I. Vavilov, *The Origin, Variation, Immunity and Breeding of Cultivated Plant,* New York, 1951.

Determining the Techniques of Handmade and Wheel-Turned Pottery by Microscopic Analysis

by S. P. GUPTA

In the beginning earthen pots were made by hand alone ; wheel-made pottery appeared quite late, probably, between 3,000 and 2,500 B.C. The transition from the hand-made pottery to the wheel-turned pottery was gradual. At an early stage the wheel used for making pottery was a slow-moving one, with the result, the surface of the wheel-turned pots did not often reveal, to the naked eye, the characteristic feature of a pot made on a fast moving wheel, i.e. clear-cut striation marks of the fingers which, sometimes create an effect of concentric channeling or fluting all along the body of the pot. Henry Frankfort has further pointed out that the " ..wheel-made pottery may not show clear traces of 'wheel-marks', since pots were frequently wheel finished for about two-thirds of their height and then roughly cut away from the mass of the clay on the wheel "[1]. It has been, therefore, difficult to determine precisely the period during which the wheel-made pottery was introduced. Archaeological literature is full of such statements which show this difficulty in clear-cut terms. A. Lucas, in his famous book entitled '*Ancient Egyptian Materials and Industries*' gives a vivid description of this state of affairs. He writes that " the date of the introduction of the wheel is a matter of some controversy." Miss D. Billington suggests that the necks of some pre-Dynastic pots may have been turned on a slow wheel, and Petrie states that " the first use of the wheel regularly is for the great jars of the royal factory in the I Dynasty". Reisner, however, says that the beginning of wheel-made pottery dates from the period between the reign of Khasekhemui and the accession of Snofru, and Frankfort states that the potter's wheel was only generally used in Egypt " about the Fourth Dynasty, though sporadically appearing since the First ". Junker maintains that "all prehistoric and Early Dynastic pottery was made by hand, and that the wheel was only introduced during the Old Kingdom "[2].

Clearly enough, an urgent need is felt to observe pottery produced by different methods, more closely and scientifically than hitherto. A state has come when we cannot just give our opinion haphazardly. We must be able to substantiate the truth of our statements from every possible angle, only keeping in view that our criterion should be, as far as possible, more objective than subjective.

Last year I took up a village of Delhi, called 'Chirag Dilli', situated on a connecting road between Hauz Khas and Kalkaji for my sociological studies of the potters and potteries and presented a paper ' Sociology of Pottery : Chirag Dilli a case study,' to the Seminar on Pottery organized by the University of Patna. Some of the participants later on suggested to me to study the technological aspect of the pottery produced in the village also. I could do a little in this field now and the results of my preliminary work are presented here. They are, in fact, tentative since they are based on a few samples only. More data is being collected and a fuller report will follow in due course of time. I do not know how far this communication will help the archaeoloical

laboratories to conduct some similar tests on the ancient potteries, but it is hoped that the observations placed below might lead to better objective methods to solve a difficult problem before the archaeologists.

The apparatus used in the present case is only a microscope. So far I have used one with only 60 times magnification, although in the case of pots of very well levigated clay one with more magnification (say upto 200, or even 300 times) may be required. I also propose to use stereo-microscope coupled with stereo-photographic camera for three dimentional photographs. It may be absolutely necessary in the case of pots made on slow-wheels.

The clay used by the potters at Chirag Dilli is normally not very fine. It contains heavier and coarser grains of silica and other minerals. Often, it is mixed with different tempering materials like husk particles sometimes containing grains, animal dung with small particles of grass, hair of animals, even particles of pottery collected after crushing the old pots with stones.

When a lump of this clay is thrown of a potter's wheel all the mineral particles, husk and grain pieces, etc. are in the form of a levigated mixed mass. The moment the wheel is moved and the clay lump begins to change into some shape due to the combined action of the rotating wheel and the pressure of fingers, the particles and pieces within the clay can no longer remain in the same position. In fact, the very process of enlargement of a small lump of clay into a big pot implies a complete rearrangement of these particles in the body-fabric.

Now the simple question is whether by observing the arrangement of these particles in general and heavier and bigger particles of different materials in particular, and also of the husk-pieces can we make out the forces and the process which created this phenomenon ? Probably, we can. The physical changes, unless completely obliterated by later disturbances of total burnishing and the like, are susceptible to identification.

It has been observed on the unbaked pots that the coarser and heavier particles of the clay used are arranged one behind the other along the ridge created in between the two concentric channels produced by the fingers. Their direction of arrangement followed the direction of the rotation of the wheel. Similar was the case with the husk and grain pieces also. The post-fired pots showed the same arrangement of the particles and burnt husk and grain pieces. If some of these pieces were completely burnt up; the resultant voids or holes are clearly found placed along the same ridges.

This happens because of the centrifugal action. Take some sand in a test tube and pour in some water. Rotate the tube in a centrifuge and the heavier particles are thrown out and separated. Although, the plasticity of the clay considerably retards this centrifugal action and acts against the force working for the centrifugal process, the coarser and heavier particles still manage to jump over the controlling force of the plasticity of the clay. Since between the two fingers moving along, the walls of pot create a space where a ridge is automatically formed between the two channels or flutings created by the fingers, the coarser and heavier grains thrown away from the centre find another hurdle in the ridge and get stuck up. In the case of lighter husk pieces the concentric arrangement may not occur in all the cases although due to the force of the fingers they too get a directional change in their placement which too roughly follow the path of the fingers.

Closely connected with it is another observation in the case of wheel-made pottery. Take a large number of measurements of the thickness of a pot both on the horizontal and vertical planes. A definite regularity is found along the channels with alternating ridges : we can determine the ridge, if along one horizontal plane the thickness is more than in the other. Thus we have alter-

nating series of thickness—one of lower denominations and the other higher. This indicates respectively the channeling and ridging, and, therefore, the use of wheel.

A third observation is made along the vertical section of the walls of the pot. Since the basic feature of a wheel-turned pot is the formation of channels and ridges, the sections of the pots under proper magnification and observation under stereo-microscope do show zig zag profile along the edges. The zig zag formation is regular inconsonance with the formation of the channel and ridge.

However, there is a serious pit-fall in this analysis against which a worker should guard himself. H. Frankfort had said that ' Deductions based on the appearance of early pottery are apt to be misleading, for pots built up by hand on a table turned on the ground may well have traces of ' wheel-marks' ". By this he meant the irregular striation marks of the fingers. To some extent it is true but pots made by the turn-table, also known as ' Turnette ' method will normally not have regular formation of channels and ridges. By its very nature, the method of turn-table' can rarely produce regular fluting. In this process a small wooden plank or basket, on which the pot to be-made is kept, is turned again and again by the potter himself or one of his assistants sitting nearby. This turning of the plank or the table, unless mechanically operated on a pivot, cannot be regulated for the spinning movement of the wheel and, therefore, at definite intervals both the channels and the ridges would show breaks in the form of kinks which must be clearly looked for and marked. It is a sign which definitely militates against the use of a true wheel.

Now, I come to the hand-made pottery. Needless to say that the absence of regular channels and ridges is clearly seen in this category of pots. When I observed a potter making a hand-made pot, I found that he is using the palms of his hands. A stationary pot, unless there is a sure and flat base, which is not the case with a pot in-making, cannot be held in position with the help of fingers alone. It is only when a pot is rotating, it can be shaped and held in position over the wheel with a feathery light touch of the fingers just as fast moving cycles can be balanced without holding the handles even. Thus when the palms are used we do not get regular flutings, instead broad patches are seen. The particles are also not arranged in any regular fashion. The thickness of the walls of pots also behaves erratically. The overall shape of the pot is also not well-formed. In the case of 4,000 year old hand-made pot from Shahi Tump in Baluchistan an attempt was made to reduce the erratic thickness of the walls of the pots to some uniformity by scrapping off the extra clay at several places by a comb like scraper.

I also tried to observe the pots which were used as water-pitchers. At the first instance a small pot with extra-thick walls was made on the wheel. It was then allowed to dry a little. When it is in the leather hard condition, a wooden dabbar and a terrocotta support were used to enlarge the body by all round beating the small pot and reducing the thickness of the walls. Pots made by this technique have sometimes shown the particles, etc. dispersed radially—perhaps due to beating of the clay. However, this observation in one or two cases need further evidence.

The results presented here, I must repeat it, are absolutely tentative based on very few pots I got made, though under my close observations. More pots will be made and more observations recorded in coming months. Once these are perfected I propose to apply them on the prehistoric pottery to work out the history of wheel-turned pots of India and the world as well.

NOTES

[1] H. Frankfort, *Studies in Early Pottery of the Near East*, I,8. London, 1962, 369.
[2] A. Lucas, *Ancient Egyptian Materials and Industries* [3] Ibid.

New Light on Central Indian Archaeology Through Kayatha Excavations

by V. S. WAKANKAR

The main work of the excavation was taken over at Kayatha, a small town 15 miles east of Ujjain on the Ujjain-Maksi Road. This site is known to have been the native place of Varahamihir and dedicated to Chitragupta (Yama's secretary), as it is said that he made penances at Kayatha and particularly at a place called Gad Maruti where we dug one of our trenches. During the two excavation seasons (1965 and, '66) four trenches were undertaken, two at Gad Maruti and two on the eastern of Toda Mound. As a result of the excavations of these four trenches we reached the following conclusions which will give us a brief story of culture sequence of the site.

The first settlement at this site started when it was densely forested. Occassionally people using microlithic tools did pass through the site but never settled. The people, whose cultural epicentre seems to be at some other place, came down to settle in this rich black cotton soil area, rich in food and water. They used to build mud houses, covered them either with grass or mud roofing called '*Ora*'.

The *Ora* is a mud roofed house with wooden supports. The mud has been plastered on the roof on either bamboos or cotton and millet branches. The authors of this culture used sturdy vessels manufactured by high speed wheel technique. The surface was slipped by dark brown cream, mauve, purple, black and yellow-ochre slips, burnished finely to give the surface a fine lustre. The surface was then decorated by multi-coloured designs and parallel bands. The technique generally gives an impression of the Harappan style and may prove to be contemporary of late Harappan industry. The shapes also show affinity with some Harappan and some pre-Harappan elements, found in Rajasthan and Punjab. This phase, which we may call as Kayatha Phase I culture, gives a rather interesting pottery sequence. The painted Black-and-Red ware, which is aboundantly found in Ahar and other chalcolithic sites of Malwa-Rajasthan complex and which is associated with the Harappan element in Gujarat and Saurashtra, is totally missing here in this phase and it may be because of the preoccurrence of this cultural tradition.

During this period which is dated to 1965±100 B.C., the site was hit by two local floods of the river Choti Kalishindh which is just flowing by the mounds. Kalishindh (Choti Kalishindh) is a tributary of the Chambal and is also referred as Gargara in one of the inscriptions of the Western Guptas found at Gangadhar which is also a chalcolithic site on the same river.

This earliest culture of Malwa, which we are tempted to call as 'Kayatha Culture' was followed by another culture marked by its profusely found white painted black-and-red pottery. The pottery of this type was associated with Harappa Culture in Gujarat and Saurashtra but also had its independant growth at Ahar (a site near Udaipur town of Rajasthan), Manoti and Awra. At Manoti a site which has now been submerged under the Chambal waters, this type of pottery was found in its earliest phases (i.e.pre-citadel and citadel phase) and is associated with Harappan

remains represented by typical Harappan jar, soapstone decorated seal and mud brick wall resting over a platform.

Phase II. : In Kayatha this cultural phase is mostly represented by black-and-red ware, painted mostly on the outer surface of carinated bowls and Burnished Red ware with light and out-flaring rim. The earlier rough pottery still continues in abundance showing either a cultural migrations or a gradual evolution.

The earliest phase of nomadic hunters is marked by the use of microlithic tools and mesolithic implements but Phases I and II are marked by the use of copper (a copper bar and a few copper objects including a copper bracelet were found along with other remains). The most important finds from these cultural deposits (PhaseII) are the terracottas which were found in abundance and much stylised figures of bulls with prominent hump and horns but no legs, no ears and no head. Some of them are decorated by serpantine lines and cresecnt marks. So far such figures are unknown from any chalcolithic site in India but bulls with crescent decorations have been found at Harappan sites.

Malwa chalcolithic, better known as Nagda-Maheshwar culture, follows this earlier culture. Remains of this culture have been unearthed at Navdatoli, Maheshwar, Nagda, Eran, Awra, Pasewa and Monoti . This is represented by profusely decorated Malwa red ware and is also associated by a type of coarse grey ware which is quite different from the northern Painted Grey Ware. Painted black on red or black on cream, is mostly marked by its dishes and cups having stands.

Portions of two burnt houses were exposed in KTH—1 and KTH—4 Trenches dating to some three and a half millennia before our era. The western part of the locality was suddenly destroyed by fire. The houses being made of bamboo and mud plaster nothing intact survived. The floors of the houses were generally paved with burnt lumps of clay and hydrolic lime. Stone balls, querns, and pestles, many earthen pots, dishes and cups-on-stand, beautifully decorated *Choclas*, and posthole marks on the floors were detected.

The site does not show any remarkable gap between different cultural deposits of historic and prehistoric eras. Iron-using people followed the earlier people. Copper ear ornaments, ivory figures of mother goddess, agate and jasper beads, iron tools, terracotta figures and *tatanka chakras* have been found from these deposits. Northern Black Polished ware pieces along with Painted Grey ware also were found with these antiquities. Then follows the Sunga period denoted by broken terracottas. Kushan glazed ware and terracotta figures have also been found. Cast copper coins bearing *Swastika* on one side and on another side the *Shadarchakra*, human-figure and *Swastika* were found on the floor of a house of this period. Conch shell bangles were also found in all historic deposits.

During the Gupta period, deposits of a house with a kitchen-room, where a *Choola*, a basin, pestle and quern were unearthed, a terrocotta figure of lord Buddha in standing pose was found lying on the floor in that kitchen.

A house of the early Parmar period was exposed in the upper layers of Trench 1. This had a small room and a hall paved with small bricks measuring 8"×12"×2". The house had brick walls mortared in sticky grey soil. The western wall was completely destroyed by brick robbers. No antiquity worth dating was found on the surface of the house. But it has been noticed throughout the site that wherever Parmar images were lying, brick pavements, plinths and walls have been observed. The covering layers at the top yielded few coins of Shah Mohammad Shah, and probably he is responsible for the destruction of all lofty temples of this site.

Thus the site with a maximum deposit of 40 feet has revealed all the major phases of the

Malwa culture through different ages and throw new light on the oldest cultural remains of this region.

This site is extensive and now is divided in several mounds known with different names, Toda and Gad being the oldest, while Bada Bazar developed during the Maratha period under Holkars of Indore. A new locality known as Adarsha Nagar is now developing south of this town. During our explorations images of Shesha Shayi Vishṇu, Surya, Shiva, Parvati, Keechak, Ganesh, Kamdhenu and head of Vishnu were found.

Parmar images and architectural pieces are lying all over the site and indicate towards a terrible destruction during the Muslim invasions. The town regains its glory during Rajput Maratha supremacy and huge buildings and temples were erected to enrich the site. The Jain temple is having a rich collection of manuscripts. A place of Holkar Dynasty still stands in the central part of the town and contains paintings in the Rajput style.

This site is rich in antiquities and the excavation has yielded more than 1,000 antiquities. The University proposes to continue the work to have more data to know about the material achievement of the oldest habitations in Kayatha.

Kayatha has proved to be the southernmost site where Painted Grey ware, painted Malwa ware, painted black-and-red ware as well as late Harappan ware which was named by us as 'Kayatha ware' because of its discovery in this site in a well stratified position, were recovered during the excavation.

The extent of Harappan influence in the heart of Malwa plateau is in itself of great importance, and many questions arise because of the new discovery. Who were the people who adopted this culture, still remains a problem as no skeletal evidence had been found at Kayatha. Either these were the local people who gradually developed a rural culture or belonged to a wave of people from outside who migrated to this part of the country which had heavily humid climate and vast stretch of furtile and rich agricultural plain.

Due to some catastorphe, about which there is little known information, which occured in Sindh and Rajasthan, the furtile alluvial valleys of Sindhu (Indus) and Saraswati became quite dry (at the beginning of third millennium B.C.) and the people started moving east to find suitable habitable land. The affinity of the pottery shapes and fabric of Kayatha ware with Harappan ware, as well as a few incised signs on potsherds with the Harappan script definitely prove that there were traditional contacts. The absence of burnt brick houses is due to the economic depression which must have taken place due to the exodus. These people brought with them the art of bronze casting as is evident from the finds at Kayatha, these consist of a bronze bar, bronze bracelet and copper wire. The Harappan complicated design on pottery is absent and it has been replaced by simple designs which apparently give pre-Harappan appearance. It is the real source of later Malwa painted ware.

When the Black-and-red ware culture overcame this earlier culture, the pottery tradition had a sudden break. The earlier ceramic industry and the developed metallurgy and many other traditions disappear with the arrival of this new but definitely inferior culture. Only the rough utilitarian pottery continued.

The new Malwa ceramic industry generally known as painted Black on red or Malwa—Jorwe, ware, which developed with its multipurpose designing and shapes indicates a flourishing cultural tradition. Who were responsible for introducing this cultural elements ? A few scholars tried to link this new ceramic industry with those of Gian and Susa and other sites of Mesopotamia but the time span between the two is over a thousands year and so this affinity may simply be supperficial. The real source of dishes-on-

stands, big *Lotas* and spouted bowls is definitely earlier and germinated in Kayatha industry.

Who were the people responsible for the growth of the Indian chalcolithic cultures is yet to be decided. Vedic people, who developed their cultural traditions in the river valleys of Sindhu (Indus), Saraswati and western part of Ganga plains might be the authors of these cultures. Malwa as the Puranic history goes, was occupied by the Awantas in Vedic days. The Haihayas followed them and had an extensive empire, but they were terribly routed by the Bhargavas of Bhṛigukachchha of Gujarat. They were again driven back by the Haihayas to gain a long peaceful reign. Whether these Puranic legends had to do something with these different cultural waves is yet to be decided, we will have to wait few more years till the decipherment of the Harappan script and that only will finalise the issue.

Malwa Chalcolithic cultures were followed by Pradyotas of Ujjaini who developed a very poor type of ceramic industry probably because they had developed metal industry and made their finer requirements of copper and iron. But they brought Painted Grey ware and Northern Black Polished ware from the Ganga Valley. Kayatha that way, is also very important as it has yielded several pieces of Painted Grey ware, this being the southernmost site so far yielding that ware.

What was going on in this area when the Harappa culture was at its zenith is partially revealed through the new excavation at Kayatha. The university proposes to continue the work and get still more information about this earlist culture of Malwa.

Radio-Carbon dates for Kayatha Chalcolithic cultures are as follows;—

Painted Grey ware	2,420±100 B.P.
Malwa chalcolithic culture	3,690±100 B.P.
Painted Black & Red ware	3,915±110 B.P.
Kayatha ware	3,665±100 B.P.

Rajghat Copper—A Metallurgical View

by H.C. BHARDWAJ

Archaeological excavations at Rajghat (Distt. Varanasi) conducted by Banaras Hindu University have brought to light a continuous cultural sequence from about 800 B.C. to modern times. A large number of copper and bronze objects have been recovered during the excavations. A few of them, all from period I (circa 800 B. C. to 200 BC) have been chemically analysed and a few examined metallographically.

Experimental Procedure

Scheme of Chemical Analysis : In order to obtain analysis the samples were made free from the corrosion products. The metallic surface was further cleaned by means of a clean file.

The sample was dissloved in nitric acid and the solution was diluted and digested. The residue if any (the residue consists of hydrated tin oxide & silica) was filtered off. To know the net weight of SnO_2, the residue was ignited with NH_4I to volatilize SnO_2 by Caley's method. [1]. The residue was further treated with nitric acid to recover any metallic constituent and the residue left was weighed and reported as insoluble residue. Mostly it consists of silica.

The filtrate from tin separation was treated with HCl to test the presence of silver which however was found to be absent, as there was no turbidity or ppt. To the above solution itself conc. H_2SO_4 was added and the solution treated till copious white fumes were liberated and then digested with water and any precipitate of $PbSO_4$ filtered.

The above filtrate was treated and a current of H_2S was passed. The precipitate was collected over filter paper. The filtrate was treated with yellow ammonium sulphide and filtrate tested for arsenic and antimony.

The residue was dissolved in HNO_3, evaporated with H_2SO_4 to white fumes, and copper precipitated as cuprous thiocyanate.

Filtrate from H_2S precipitate was treated with nitric acid and iron precipitated with NH_4OH. Nickel was determined in the filtrate as dimethylglyoxime complex. Cobalt was tested in the filtrate with α Nitroso β naphthol.

Determination of Arsenic and Antimony

Quantitative estimation of arsenic was made in case of Specimen No. 6, on a separate sample. The sample was dissolved in conc. HNO_3 and after removal of excess of nitric acid the nitrates were decomposed and the residual material was dissolved in conc. HCl. Requisite amount of ferrous sulphate was added to ensure their continuation in reduced form and the solution was distilled at 108°C. A current of H_2S was passed into the distillate and the precipitate filtered through sintered glass crucible, washed with a mixture of CS_2 and alcohol, dried and weighed and percentage of arsenic calculated from the weight of As_2S_3.

Further distillation was carried out at a higher temperature upto 200°C and H_2S passed, but the amount of antimony was too small for quantitative estimation.

Determination of Sulphur. Determination of sulphur was done on separate samples. The sample was decomposed with HNO_3 and any residue filtered. The filtrate was treated with HCl, and evaporated to remove excess of nitric acid, the residue was again treated with dil HCl and

S (present as sulphate) was precipitated with $BaCl_2$ in hot solution and weighed as $BaSO_4$.

Metallographic Examination : The specimens were mounted in bakelite at a maximum temperature of 150°C and maximum load of half a ton. They were ground over successively finer grades of emery papers (from one zero to four zero) and then polished on silvet cloth on rotating discs containing fine alumina abrasive powder, finally these were given a finishing hand polish with brasso. The as polished surfaces were examined under metallurgical microscope to reveal non-metallic inclusions. Then the surfaces were etched, with ferric chloride solutions ($FeCl_3$ 10 gms., conc. HC1 30 c.c., water 120 c.c.) or (Ammonium hydroxide—conc. 10 c.c., H_2O_2—1.00 c.c.) etching removes the thin deformed layer produced by polishing and provides contrast to the various microstructural constituents.

Results of Chemical analysis (See table below)

From the table below, we find that sample No. 1 and 2 are of bronze and 3rd contains 1.6% of tin, samples 4, 5 and 6 are of unalloyed copper. In unalloyed copper samples the maximum percentage of copper is 98.05 and minimum copper content is 95.45%. The balance of 2 to 4.5% is distributed amongst impurities. Major impurities are lead, iron, nickel, calcium oxide, magnesium oxide, sulphur and oxygen (O_2 has not been chemically determined but its qualitative presence was marked during metallographic examination. O_2 has in all the cases been determined only by difference).

Significance of Impurities

Sulphur : Sulphur is present in all the specimens from traces to 0.75%, this might suggest the use of sulphide ores (as copper has great affinity for sulphur there could also be some chances of sulphur entering through other sources) [2]. The quantity of sulphur in the final product would depend upon degree of roasting. Lesser the sulphur greater has been the roasting. It might be of interest to mention that cuprous sulphide undergoes no change without excess of air, when excess of air is available sulphur is partially converted to SO_2 which escapes out, partly it is converted into sulphuric acid which forms copper sulphate, which decomposes only if temperature is raised to strong red heat. Normally some sulphur would always be left in copper. For complete removal of sulphur the metal should be thoroughly molten, when SO_2 will escape out, any shaking and poling further helps the escape of SO_2. In earlier periods the metal was not always kept in molten condition for long time, and so some SO_2 always remained entraped. [3]

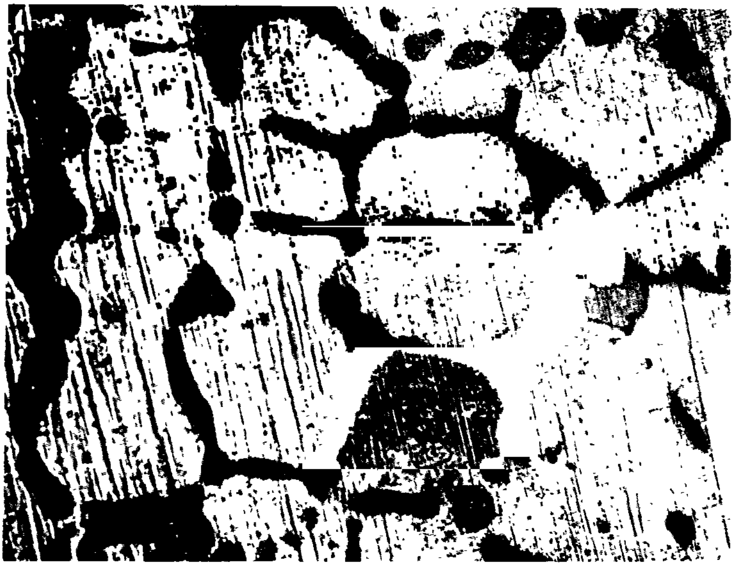
Iron : Iron is present in all specimens and its content varies from 0.21% to 2.23%. Its source could be the sulphide ore, which have iron pyrites associated with it. Most of the iron is quite easily removed from copper during smelting, as there are very little chances of iron oxide being, reduced to metallic state, most of it passes into slags, its variable content could be on account of slight changes in the smelting conditions. Its presence along with that of sulphur suggests the use of sulphide ores. Its presence might also indicate the lack of thorough and prolonged melting.

Nickel, Cobalt, Arsenic, Antimony

The sulphide ores of copper are always associated with a number of metallic elements e.g. Fe, Co, Ni, Mo, Ag, Au, As, Sb, Sn, Pb, Cd, Zn, Se and Te etc. Some of these or all of these might be present in a particular ore. Few of these elments might be removed completely or partially during smelting due to their volatilization e.g. As, Sb, Cd, Zn, while a few others baser than copper e.g. Sn, Co, Ni, Fe, Pb, could be at least partially removed by oxidation and slagging, while nobler metals like Ag or Au are enriched during smelting.

TABLE SHOWING THE RESULT OF CHEMICAL ANALYSIS OF RAJGHAT COPPER OBJECTS

Sr. No.	Nature of the object	Period	Appr. Date	Ins. or Residue	Cu %	Sn %	Pb %	As %	Sb %	Fe %	Ni %	Co %	CaO %	MgO %	S %	O2 by diff. %	Total
1.	Coin (Bronze)	1 C	300 BC 200 BC	—	86.90	7.83	0.83	+	N.D.	1.50	1.07	+	N.D.	N.D.	Tr.	1.87	100.00
2.	Bronze fragment	1 C	400 BC 200 BC	0.84	79.40	13.99	0.09	Tr.	Tr.	2.23	N.D.	+	2.46	0.74	Tr.	—	99.75
3.	Piece of a copper Bangle	1 C	400 BC 200 BC	0.32	93.93	1.82	Tr.	+	N.D.	1.09	0.32	N.D.	1.86	0.38	0.48		100.20
4.	Copper Fragment	1 B	600 BC 400 BC	—	98.05	—	Tr.	+	+	0.37	0.08	N.D.	0.85	0.17	Tr.	—	99.52
5.	Antimony Rod	1 B	600 BC 400 BC	—	96.38	—	—	+	—	0.21	0.08	N.D.	2.31	0.84	0.75	—	100.57
6.	Piece of a copper sheet	1 B	600 BC 400 BC	—	95.45	—	—	0.25	Tr.	0.96	0.15	+	1.75	N.D.	0.20	1.24	100.00

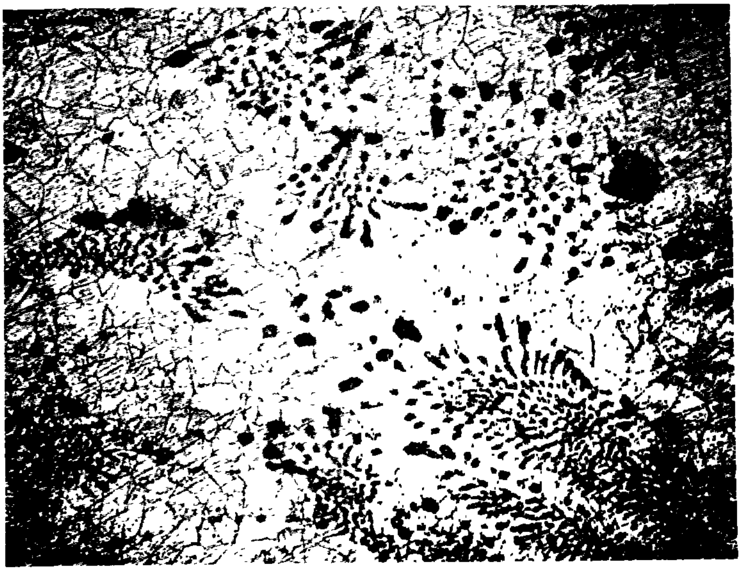


A. Photomicrographs showing micro-constituents of specimen No. 1 x 200 (unetched), showing low melting inclusions as grain boundary network dislodged during grinding.

B. Photomicrograph showing micro constituents of Sp. No. 1 100 Etched with NH_4OH - H_2O_2 showing cast structure with coring. Lighter etching bands are copper rich, interior tin rich.

PLATE IV

A. Photomicrograph showing micro-constituents of specimen No. 6 × 200. Etched with $NH_4OH-H_2O_2$ showing hot worked globular eutectic, alternate banding, recrystalized finer grains and finer eutectic.



B. Photomicrograph showing micro-constituents of Sp. No. 6×200. Etched with $FeCl_3$ solution. (Flat surface) Eutectic percentage about 8%.

Nickel : Nickel has strong affinity for copper and on that account whenever the ore has nickel content some of it would be invariably found in the metal extracted. Though normally nickel should go into slag, yet it is always retained in the metal to some extent. When ore has a high content of nickel, the first few percentages of nickel pass into slag, but when amount of nickel decreases slagging becomes slower and the removal of the last portion is most difficult. Further nickel oxide is soluble in copper and hence its chances of retention in the melt are always there. If the reducing conditions prevail in the furnace, nickel oxide is reduced to metal and is absorbed by copper [4]

Cobalt : Cobalt behaves like iron during extraction of the metal. It is readily oxidized and slagged off. However if ore contains higher percentage of cobalt, it would require considerable time for its removal, its smaller content as compared to iron is on account of its comparative low percentage in the ore itself.

Lead : Lead is present in most of these specimens in small quantity and its source must be the impurity in the ore itself, lead when present in the ore is supposed to be persistent impurity. However, if slag is acid, its removal is favoured.

Tin : Except the 1st three specimens (in which tin seems to be deliberate addition) it is otherwise absent. So there is no proof of the ore containing tin. However tin when present in small quantities will be eliminated if the slag is basic.

Arsenic and Antimony : These elements partly volatilize during smelting but are not eliminated completely. Bray [5] mentions that distribution ratio of arsenic in slag to arsenic in the metal is over 500 to 1. During roasting As and Sb volatilize as As_2O_3 and Sb_2O_3, but some of these are converted to As_2O_5 and Sb_2O_5 which are less volatile, which form non-volatile arsenate and antimonate with copper. Amount of As and Sb would depend upon the nature of the atmosphere during roasting [6].

CaO, MgO : The presence of CaO and MgO suggests the presence of slag particles and may even indicate insufficient melting. The intake of CaO and MgO can also be due to the melt attacking the refractory material of the furnace.

Metallographic Examination

Specimen No. 1. (Pl. III A) : When examined metallographically in an unetched section reveals low melting inclusions as grain boundary net work, which have been dislodged during grinding. The examination of the etched section (Pl. III B) reveals cast structure, coring is clearly visible due to the segregation of tin on solidification. This coring effect might be attributed to comparatively fast rate of solidification. (It is clear that unless time is allowed for adjustment of varying crystal concentrations during freezing, the crystal has an inhomogenous structure, resulting in dendritic segregation or coring.) In the Pl. III B the lighter etching bands are copper rich, interior is the tin rich. The specimen has a hardness of V.H. N. 66. This is a low hardness for a bronze sample and can be attributed to the low melting grain boundary inclusions.

*Specimen No.*6 Metallographic examination of Sp.No.6 (Pl. IVA & B), shows hot worked metal, copper—copper oxide eutectic is also visible as globular alternate banding(Pl. IV A). The grains are finer in size and look to be recrystallized. Annealing twins are visible throughout the section as evidence of heat treatment above the recrystallization temperature. The examination of flat surface shows (Pl. IV B) that the eutectic is about 8 to 10%.

The hardness at V.H.N. is 112. This increased hardness is due to finer grain size and finer eutectic..

The author is thankful to Prof. A.K. Narain, Head of the Department of Ancient Indian History, Culture and Archaeology of Banaras Hindu University, for providing facilities and giving encouragement throughout this work. Thanks are also due to Prof. T.R. Anantharaman, Head of the Department of Metallurgy, and Dr. S. Misra of the Metallurgy Department, B.H.U. for providing facilities for the metallographic examination.

NOTES

[1] E. R. Caley & H. G. Burford, *Ind. Eng. Chem. Anal* Ed. 8, 114, 1936.

[2] R. F. Tylecote, *Metallurgy in Archaeology*, 27.

[3] W. Gowland, *Nonferrous metals*, 54.

[4] D. M. Liddle, *Hand Book of Non-Ferrous Metallurgy*, 1945, 245.

[5] J. L. Bray, *Non-Ferrous Metallurgy*, 1947, 200.

[6] Joseph Newton and Curtis L. Wilson, *Metallurgy of Copper*, 1942, 70.

Chalcolithic Burials : The Tekwada Evidence

by M. K. DHAVALIKAR

Consequent upon the discovery of the post-Harappan chalcolithic phase in Indian Proto-history, a considerable number of sites have so far been excavated in Central India, 'Western India and the Deccan. Of these, the chalcolithic cultures of the Deccan are characterised by burials which, on account of their variety, are indeed worthy of special attention. Besides providing us clues to the racial characteristics of the authors of the chalcolithic settlers they have also yielded valuable information concerning the eschatological beliefs of these pioneering colonizers. The burials themselves, as is usually the case, are rich in their contents which comprise a variety of vessels which once contained food and water for the deceased, his ornaments and his tools and weapons, mostly lithic. There is ample evidence, stratigraphical and otherwise, to show that the burials belong to the authors of the Nasik-Jorwe culture which has now firmly been assigned, on the basis of the C-14 determinations, to the time bracket *circa* 1,500 B.C. to 1,000 B.C.

The chalcolithic burials of Maharashtra were first encountered at Tekwada (District Jalgaon, which is situated on the left bank of river, Girna, a truibutary of Tapti. As the Cemetery lies just across the Viven opposite the habitation site at Bahal, it seems most likely that it belongs to the earliest settlers of Bahal. Later still, chalcolithic burials were also discovered at Nevasa, Chandoli, Daimabad and several other sites in the Deccan. They can be classified into three distinct categories namely, (i) the pit burial with extended skeleton, (ii) the single urn burial and (iii) twin or multiple urn burial. Of these, the twin (or the multiple) can be said to be a distinguishing feature of the Nasik-Jorwe culture. Herein we find in a moderate sized pit two grey ware urns with globular profile and wide, flaring rim, placed mouth-to-mouth horizontally and containing, of course, the mortal remains of the departed soul along with burial goods such as vessels of food and water, personal ornaments and tools and weapons [1]. Another variety of this class consists of more than two urns-either three [2] or five [3]-of which two in the middle are placed mouth-to mouth and the others with their mouth accomodating the bottom of the adjoining one in which case the bottom is broken so that all the urns form a sort of coffin. It appears that such urn burials were rather meant for children while the ashes of adults are also occasionally encountered. In the pit burials usually we come across extended skeletons of adults.

The single urn burials form a class by themselves. They are rather rare in the Nasik-Jorwe culture zone and have not so far been encountered anywhere except at Tekwada and Daimabad [4]. Typologically they are altogether different and therefore can be taken to represent, with a reasonable amount of certitude, a different, cultural tradition. Belonging, as they do, to the Nasik-Jorwe culture complex, they appear to be a diagnostic trait of yet a different cultural strain. This would at once become apparent if we take into consideration the fact that the Nasik-Jorwe ware folk at all places preferred the extended or the twin or the multiple urn burial system. Their total absence in the Tekwada cemetery where, at the same time, we come across

an entirely different practice of enshrining the mortal remains, brings into relief their unique character and importance. Before, however, assessing the position of these burials *vis-a-vis* other contemporary practices which were in vogue in the Deccan, it is desirable to analyse carefully the evidence from the excavations at Tekwada.

The burials at Tekwada were first discovered by M.N. Deshpande of the Archaeological Survey of India during his explorations of the ancient site at Bahal in 1951, when the stratigraphical horizon of the painted black-on-red pottery, now known as the Jorwe ware, was first determined by H.D. Sankalia and his colleagues in their excavation of the ancient site at Nasik. Bahal, from surface explorations, was established to be a chalcolithic settlement and was therefore selected for stratified excavations. The burial site across the river yielded crude handmade fragments of huge urns and also a black-and-red pottery which can better be described as black-and-grey represented by a variety of bowls reminiscent of those from the Stone Axe culture levels from Brahmagiri. Consequently the Tekwada cemetery was excavated, first in 1952 and again in 1957. We have a brief account of the second season's work [5]. The writer had an opportunity of participating in the Tekwada excavation in 1957. Only a few burials were exposed; they are all quite modest so far as the contents are concerned, but a closer examination will show that they occupy a unique position in the development of chalcolithic cultures as will be evident from the discussion in the following pages which is based mainly on the writer's field observations made during the second season's work.

During the first season in 1952 four burials in all were opened. Of these, three were urn burials and the fourth was a pit burial containing an extended skeleton. The urn burials, on opening, were found to contain, along with the mortal remains, small bowls of the black-and-red or grey ware. The skeleton was deposited in a pit specially dug for the purpose and contained a single black-on-red painted vessel of the Nasik-Jorwe fabric. It wast his vessel which instantaneously, and rightly too, led the excavator to correlate the burials with the habitation site of Bahal. In other words, the burials probably represented the mortal remains of the earliest inhabitants of Bahal.

In the second season in 1957 four more burials were excavated. Out of them, three were urn burials, laid in the natural black cotton soil, and fourth, a pit burial cut deep into the underlying yellowish clay. Of the urn burials, one was found disturbed and robbed while the other two were preserved intact. They each consisted of a huge urn covered by a large hemispherical lid and contained a few bones presumably of children and respectively two and five bowls of black-and-red or grey ware. Some of these bowls also bore graffiti,. In one of the jars were found a few beads of paste, a spherical bead of carnelian and a circular, tabular bead of steatite.

The pit burials contained the skeleton of an adult of medium height (about 5 feet 2 inches), laid in a north-south orientation. There were in all three pots in the pit; one of fine grey ware and the other of painted black-and-red variety. The third vessel was a high necked globular jar of the Nasik-Jorwe fabric. It was red slipped and was painted with black. The motif consisted of curvilinear lines forming a shell pattern and joined together by a bank and with six oblique strokes at the top of each curved loop. It was this jar and also the black-and-red pottery which constituted undubitable evidence for connecting the burials with the chalcolithic phase of occupation of Bahal. According to the excavator, the burials are contemporaneous with the phase IB of Bahal [6].

The Tekwada burials are thus modest in form and content and the evidence does appear,

on the face of it, quite negligible. But a close analysis of the evidence reveals certain hitherto unknown features. The extended burials have been paralleled at Daimabad [7], but the urn burials are undoubtedly unique for the simple reason that they have no analogues elsewhere [8]. Conversely, the commonest practice of enshrining the mortal remains in twin or multiple urns is conspicuously absent at Tekwada. Instead we have a single urn of different form and fabric, that is, not of the usual grey ware class which is represented at several sites in the Deccan. This typological variation alone would qualify the Tekwada urn burials to be grouped as a class by themselves thus representing an altogether different cultural tradition which is probably betoken of the existence of a new set of people in the chalcolithic population of the Deccan.

The pottery from the burials also merits special attention . The pit burials contained, as reported, a painted black-on-red jar, fine grey ware and painted black-and -red ware pots while the pottery from the urn burials is quite different. The huge urns are of thick, coarse fabric and handmade and are reddish grey in colour. They have an elongated body, ovalloid in shape, with wide flaring mouth, tapering sides and a small flat base. In form and fabric they are entirely different from the usual chalcolithic burial urns which resemble those in the Brahmagiri grey ware. The urns were covered by hemispherical lids of the same fabric. The urns are reported to have contained a number of small black-and-red or grey ware bowls. They were not painted but were scratched with graffiti either on the internal or the external or both the surfaces. They have close analogue in the pottery from the Stone Axe culture phase of Brahmagiri [9] and the shapes also bear a family resemblance to those from megaliths [10]. These bowls contained eatables and water for the deceased.

So far as pottery is concerned, the negative evidence is equally important. In the chalcolithic burials of Maharashtra we usually find painted pottery of the Jorwe fabric and not a single fragment of the black-and-red or grey has so far been found in them. The characteristic spouted vessel and the carinated bowl, both painted, are almost invariably present in the twin or the multiple urn burials. In contradistinction with this, the Tekwada urn burials did not contain a single fragment of any painted vessel which, however, has been reported from the pit burials. The latter in their turn, were also furnished with painted black-and-red ware vessels. It is now known that the painted and the plain black-and-red wares of the proto-historic period are two different ceramic traditions. The absence of the plain black-and-red ware in the pit burials is therefore certainly not without significance. On the whole, the ceramic evidence from the burials tends to point to two different funerary traditions, unrelated to each other.

The stratigraphical evidence should be reasonably expected to provide a convincing proof of the inter-relationship of the pit burials on the one hand and the urn burial on the other. In this connexion it is necessary to impress that the burials lie in the black cotton soil field which has been under cultivation for centuries. Furthermore, they are located on the fringe of the river deposit in such a manner that the monsoonal floods are every year washing away the valuable burial remains and are also disturbing the configuration of the ground. Thus the natural and human agencies have caused unimaginable damage to the cemetery and any attempt at stratigraphy in the excavation of burials was therefore bound to be futile. Nevertheless, an attempt was made to observe the relative stratigraphical position of the two groups of burials. It was noticed that the urn burials were laid in the natural black cotton soil while the burial pit for the extended skeleton was cut deep into the underlying yellowish clay [11]. It is difficult to state precisely what this implies in terms of strati-

graphy, but the evidence is certainly not without significance.

Another interesting feature of the Tekwada burials is that they constitute a cemetery by themselves and are not located within the habitation area. In the Nasik-Jorwe culture sites the burials are found within the habitation area itself; more often than not, they are below the house floors [12], a practice which was in vogue in different parts of the world since remotest times. This was done with a view to having the departed soul within the precincts of the house. But the isolation of the cemetery from the habitation as at Tekwada, certainly marks a new development.

Both the pit and the urn burials undoubtedly belonged to the chalcolithic phases for the former is characterised by the evidence of a painted Jorwe ware jar and the latter contained black-and-red pottery similar to that from the Phase I of the habitation. The excavator rightly observes that the burials are contemporaneous with period IB of Bahal [13]. But, if the evidence from the burials—typological, ceramic and stratigraphical—is any indication, it appears that the two different funerary traditions represent two distinct cultural phases, not far removed from each other in point of time. One of them is characterised by painted pottery in the burials while the distinguishing feature of the other, that is, the urn burials is the absence of it. This may superficially appear rather absurd, but has been most unexpectedly corroborated by recent discoveries in Karnatak and Vidarbha.

In the upper Krishna valley of the northern Karnatak a number of neolithic-chalcolithic sites as also innumerable megalithic burials have been recently discovered by A. Sundara [14]. The chalcolithic habitation sites are located along the bank of the river while the megalithic burials are concentrated only in the Kaladgi sandstone zone which is not far from the river course, the maximum distance being about 20 kilometres. The sandstone formations run almost in an east-west direction and as one goes towards east it will be noticed that the Kaladgi rocks and the river gradually come in colse proximity, so much so, that they are both to be seen by the side of each other at Terdal (Bijapur District, Mysore). The place appears to have been of great importance in the ancient past for there are four different localities where relics of the neolithic-chalcolithic period are found while on the adjoining rocky outcrop have been encountered hundreds of megalithic tombs. The small-scale excavation by Sundara revealed that it is a single culture site which was occupied during the neolithic-chalcolithic period which can be equated with the Stone Axe culture of Brahmagiri on the basis of the evidence of the burnished grey ware. It also has, in addition, a painted black-on-red ceramic akin to that from the Tapti valley. The most interesting evidence, from our point of view, comes from a burial of this phase which, curiously enough, situated not within the habitation area but away from it in the locality which was slightly later turned into cemetery by the megalithic people. The burial consisted of an extended inhumation in an ovalloid pit which also contained vessels of the Brahmagiri burnished grey ware fabric, a microlithic outfit and a copper bangle, all of which bear unmistakable affinity with the equipment from the settlement area. The most noteworthy factor here also is the absence of painted pottery in the burial as at Tekwada.

The same story is almost repeated in Vidarbha but in the megalithic context [15]. The excavations at Takalghat and Khapa (both in Nagpur District, Maharashtra) conducted by S.B. Deo on behalf of the Nagpur University have brought to light, for the first time, a habitation at the former site characterised by the use of painted black-on-red pottery associated with black-and-red and micacious wares. The other site, Khapa, is literally strewn with megalithic stone circles which are situated on the other bank of the rivulet,

Krishna by name. The excavation of the burials have yielded a rich range of metal objects buried with human and animal remains. The repertoire of metal objects consists of a variety of tools and weapons of iron and a considerable number of copper objects among which mention should be made of copper mask-like objects with iron rivettings. The burial pottery is the black-and-red ware, the micacious red ware and a coarse red fabric, all exactly similar to those from the habitation site of Takalghat. But surprisingly enough the painted black-on-red pottery, so characteristic of the habitation areas is conspicuously absent in the burials. Deo therefore rightly observes that "if the megalithic builders at Khapa and the inhabitants fo Takalghat were culturally identical, it appears that the painted pottery was used only in everyday life, but not in the burials" [16].

The combined evidence of Takalghat and Khapa is extremely important for it represents a culture which is on the threshold of iron age. The lithic tools are no more required for copper is in use and iron has also at the same time made its advent. The painted pottery tradition too continues. What is important from the point of view of the present study is the absence of painted black on-red pottery in the burials [17]. It has to be conceded that the megalithic pottery and the burial types have nothing in common with Tekwada urn burials; the only trait that is significant and common to both is the persistent tradition of the use of painted pottery in every-day life but not in burials.

The foregoing analysis of the typological, ceramic, and stratigraphical evidences from the Tekwada burials amply makes it clear that there were two distinct burial traditions in vogue at Tekwada even during the chalcolithic period. They were, in all probability, slightly removed from each other in point of time; the extended inhumations belonging to the heyday of the poineering settlers of Bahal and the urn burials representing the end phase of the chalcolithic period when the black-and-red was coming into its own and the painted pottery tradition was dying out. The same custom was current in in northern Karnatak as the Terdal evidence shows. The tradition further survived at Takalghat and Khapa in Vidarbha in some form or other and it seemd likely that it also influenced the megalithic urn burials of the later period. The megalithic urn of Pudukottai is not typologically far removed from its counterpart at Tekwada [18]. "These are the cultural trends," according to Soundra Rajan, "that we witness in the developing mosaic of habitational and funerary culture diffusion from Central India and Upper Deccan into Lower Deccan, as brought forth by the excavation at Bahal, Ujjain, Maheshwar and Prakash variously to mention only the most significant to yield favourable data in this direction." [19]. The parallels are significant and no doubt lead to the complicated problem of the chronology of megaliths. That, however, is the wider problem of the sub-continent. Presently it would suffice to take into consideration the position of vital importance of the Tekwada burials.

NOTES

[1] *Indian Archaeology* 1958-59, *A Review*, (abbreviated as *IAR*), Pl. XXVA.

[2] Ibid, Pl. XXVB.

[3] *IAR*—1959-60, Pl. XXXB.

[4] This infant-burial is different from that of Tekwada. See *IAR*—1958-59, 18.

[5] *IAR*—1956-57, 18-19.

[6] Ibid, 19.

[7] *IAR*—1958-59, Pl. XXIV A & B.

[8] The Brahmagiri urn burials are of a different category and in no way resemble those of Tekwada. For Brahmagiri types see *Ancient India*, No. 4, 1947-48, Pl. CVIII & CIX.

[9] Ibid, *Cf.* Fig. 21, T 45, 46 a & b ; Fig. 22, bowl types.

[10] Ibid, Fig. 17, bowl types.

[11] *IAR*-1956-57, 18.

[12] H. D. Sankalia and others, *From History to Pre-History at Nevasa*, Poona, 1960, 506.

[13] *IAR*—1956-57, 19.

[14] I am thankful to my friend Sri A. Sundara for the information about the evidence in northern Karnatak which will appear in greater detail in his forthcoming paper entitled 'Preliminary Investigations into the Chalcolithic Phase of the Upper Krishna Valley, North Mysore'.

[15] I am grateful to Prof. S. B. Deo for this information which is based on a brief account circulated by him.

[16] Ibid.

[17] It must only be surreptiously that a painted black-on-red bowl with hole-mouth spout found its way into a megalith at Junapani. See *IAR*-1961-62, 33-34.

[18] V. D. Krishnaswami, 'Megalithic Types in South India', *Ancient India*, No. 5, 1949, Pl. XIVA.

[19] 'Chronological and Cultural Aspects of the Indian Neolithic, Based on Recent Data', *Journal of Indian History*, XLII, 1964, 117.

Stratigraphy, Probable Climatic Phases and Dating of the Stone Age Cultures of Upper Son Valley

by NISAR AHMAD

No palaeontological evidence is yet available from the Son valley to date the various archaeological horizons. However, the river deposits of a few regions in Peninsular India have been dated on palaeontological, geological and archaeological grounds. Hence, against the background of this available evidence, an attempt is made here to work out a chronology of the Stone Age industries and the climatic phases associated with them in the upper Son valley.

Stratigraphy

The river Son, which is parabolic in nature—steep near the source and expanding its bed towards the mouth—exhibits the Pleistocene deposits at Navatola, Salamtola, Bakahi, Ruhanian and Ramnagar—only the last named yields two gravels. Evidently the Pleistocene deposits in this river have been buried under the huge deposits of sands. In Sidhi District, the artifacts come from the loose gravel patches lying on the sand-bed of the stream which are the result of the present aggradation.

That the river is very ancient is proved by the following geomorphological evidences. Near Devalond (24° 12', 61° 20') it twice crosses a prominent ridge of quartzite and the fact is that it had determined its course prior to the existence of this ridge. The east to west course of the Son was established before the formation of the Kaimur scarps when the relief was low and the river flowed over the shales of the soft Lower Vindhyan[1].

However, these evidences of the mainstream were meagre and insufficient to place the various cultures in the proper context and hence the exploration was also carried out in some of its tributaries.

The sequence of various deposits as seen in the river Son and its tributaries is described in the following paragraphs.

Son

The Son rises in the unclassified crystalline archaean formations and after flowing for about 5 km. in the archaean terrain, it flows through Lower Gondwana formations for about 100 km. However, at places it cuts through the trappean outliers during its journey through Lower Gondwana formations. Because of the presence of softer rocks in this part the coarser bouldery and pebbly gravels are not seen in the various cliff sections. And, therefore, at Navatola and Salamtola, which occur in the Lower Gondwana, the bottom of the cliff is composed of highly compact kankar mixed with a few pebbles of quartzite etc. and capped by dark brown sandy silt. The latter is followed by black brown soil. The lower deposit yielded eleven Early Stone Age tools.

After Salamtola, the river was examined at various places. There the banks are composed of yellow brown silt and the river bed is mostly sandy.

At Bakahi and Ruhanian, the sandy gravel patch rests on the rock and is in turn followed by the yellow brown silt and black brown soil, respectively. Late Stone Age tools were picked up from the surface of the black brown soil.

After Markandey the river starts flowing through Upper Vindhyan formations and naturally, because of the change in the bed rock lithology, bouldery and pebbly material is commonly seen in the bed of the river.

In the downstream near Jogadh Bridge, dark brown sandy silt lies over the rock bed and is capped by the sandy gravels, which yielded Middle Stone Age tools. It is followed by yellow brown silt and black brown soil. Early Stone Age tools were obtained from the top of the latter.

At Ramnagar in a rain gully, the cliff-section at the bottom has cemented bouldery and pebbly gravel and is overlain by dark brown sandy silt. It is followed by sandy pebbly gravel and sandy yellow brown silt. On the top is black brown soil. No *in situ* tool could be found in the lower graval. Three MSA tools were discovered *in situ* from the second gravel which is less cemented than the previous one. Two LSA tools were picked up from the surface of the black brown soil.

Katni

On the Kanti *nadi* at Murwara, a well cemented bouldery and pebbly gravel is exposed in the bed of the river and also in the cliff section. It is overlain by highly kankarized silt. The latter deposit is followed by the yellow brown silt and black soil. Seven tools were extracted from the cemented gravel.

The lower cemented gravel and its overlying kankary silt probably represent early Middle Pleistocene, while the yellow brown silt which caps the kankarized silt may belong to late Middle Pleistocene period. No MSA tools could be found either in the Pleistocene deposits or in the modern bed materials of the stream.

Jhepawan

The section on the left bank of river Jhepawan near Banjari shows cemented bouldery and pebbly gravel to be resting on a rock. The gravel is further capped by dark brown silt which is followed by black brown soil. In the gravel layer five ESA tools were found *in situ.*

Hiranya

On the left bank of this *nadi*, near Parnia village, a section, consisted of a well cemented pebbly gravel and followed by dark brown sandy silt, was found. The latter is capped by fairly consolidated sandy gravel which is further overlain by yellow brown silt. On the top is black brown soil. One flake, 160 mm. in length, made on chert, was removed from the pebbly gravel while the overlying sandy gravel yielded two MSA tools made on chert. Two hand-axes made on chert were found in the loose gravel lying in the bed of the stream.

LSA tools were found from the surface of the black brown soil.

Sukha

The section on the left bank of this river near Sidhi town had the deposits of only one period, viz. cemented pebbly gravel and dark brown silt. On the top is black brown soil. No stone age tool could be recovered from the gravel. LSA implements were found from the surface of the black brown soil.

Mohan

On this stream three sections were located, two of them at Deosar and one at Majona. All the three sections show from bottom upwards : cemented pebbly gravel, dark brown silt and black brown soil. One chopper, and one flake were found *in situ* in the gravel at Deosar and Majona respectively. LSA tools were found from the top of the black brown soil at Majona.

Johilla

In the cliff-section of this river between Gorai and Barachanda, slightly cemented bouldery-pebbly gravel rests uncomformably on the Gond-

wana sandstone. It mainly consists of trap, a few chert and granitic components. This deposit is overlain by sandy brown calcareous silt which is again capped by a thick deposit of slightly cemented pebbly sandy gravel, which in composition and texture does not differ much from gravel I. At places it is more sandy and shows cross-bedding. Both the gravels yield MSA tools made on chert. However, one chopping-tool of chert was also found *in situ* in gravel I. Seven ESA tools made on chert and breccia were collected from the loose gravel bed of the stream within a distance of about 3 km. downstream from this section. LSA tools were picked up from the fields. The overlying silt of gravel II is thick, sandy and calcareous. The intervening silt between gravel I and gravel II does not appear to form a continuous deposit for a considerable distance, instead it thins down within a distance of about 1 km.

From the archaeological as well as geological evidences, it appears that the gravels I and II, observed in the section, are the result of one aggradational phase with slight change in the sedimentation process as represented by intervening silt.

This unusual thick deposition might have occurred because of the sudden drop in the gradient of a river and its feeding tributaries and also because of some obstruction in the form of hard rock barrier which prevented the main stream in carrying its load further downstream. The sandy and silty layers in this gravel deposit mostly indicate channel changes due to braiding and meandering processes.

Summary

The above observations reveal that the deposition of two gravels in the upper Son valley is seen only at Ramnagar (Son) and Parnia (Hiranya). ESA tools could not be found from the basal gravel of Ramnagar and a big flake of chert removed from the lower gravel of Parnia does not provide much support for the existence of ESA industry in that deposit. However, these lower gravels may be equated with the well cemented gravel of Murna (Katni), Deosar, Majona (Mohan) and Banjari (Jhepawan) yielding only ESA tools.

Thus the two periods of aggradation may be noticed in the Pleistocene deposits of the upper Son valley. The ESA bearing gravel is generally bouldery and pebbly in nature and rests uncomformably on the solid rock. It is sometimes capped by sandy dark brown silt. This silt is further capped by MSA bearing sandy gravel which is again overlain by brownish yellow silt.

LSA tools were lying at many places on the top of the black brown soil. It may also be pointed out here that a microlithic industry also had its extension on the lower hills.

Climate

The upper Son receives on an average about 50" of annual rainfall and is fairly covered with open decidurous forest. Tectonically, the region is stable and probably it was so even during the Pleistocene times. The beahviour of the Son is directly not affected by eustatic changes of the Pleistocene. And hence the changes in the nature of the texture of the Pleistocene sediments appear to have occurred mainly because of the climatic changes in the Pleistocene.

The climate in general must have been of the present character, i.e. sub-tropical monsoonic. However, the extensive glaciation in the higher latitudes and also in the Himalayas might have affected the atmospheric circulatory patterns, the rate of evaporation of the sea water etc. and hence this part of peninsular India might have experienced different types of climate during the Pleistocene. There might have been wetter monsoons and drier monsoons probably corresponding with glacial, interglacial fluctuations of the higher latitudes. Whether the changes in the higher and lower latitudes were homotaxical

or not, is very difficult to assess in our present state of knowledge of the Pleistocene climate.

Hypothetically, we may assume that the wet period in the upper Son was slightly wetter than the present one and the dry one was much drier than the present one. Both the periods were probably of sufficient duration and intensity so as to affect vegetation and geomorphic processes significantly.

During the wet period, the vegetation cover in the valley probably might have been quite thick as to reduce the surface run off of rain water and also soil stripping. The major streams like the Son were flowing with ample water with increased competence and capacity which enabled them to transport cobbles and pebbles for considerable distances. The rapidly flowing turbulent waters with their powerful tools of pebbles and cobbles of hard quartzites could also eat down vertically their own valleys. The vertical incision as well as deposition of coarser material at suitable places in the channel of the streams must be occurring during even monsoon season in the wet phase. But the overall incision was dominant in the peak period of wet phase while overall deposition of cobbly and bouldery gravels probably ensued during the declining period of wet phase when the capacity and competence along with total discharge of the streams were greatly reduced.

In the dry period, the vegetation matt in the valley probably was very sparse and this increased the surface run off and soil stripping. Lot of finer materials like sand and silt came down into the trunk stream through ill-defined drainage during occasional stormy rains. The competence of the streams was less and the general tendency was more towards aggradation and hence there was general alluviation in the valley—both in the mainstreams and its tributaries—during occasional stormy rains of the dry monsoons.

There were probably two wet phases and two dry phases in the Pleistocene period. In the wet phase, coarse cobbly and pebbly gravels, along with ESA tools were laid down over highly contorted rocky bed. It was followed by a dry phase in which river alluviated its valley with finer sand and silt in which no stone age tools were found.

The second wet phase was probably less intense than the first one and the incision of the earlier alluvium was not very strong and the gravels deposited over the earlier silt in the declining stages of the wet phase were much finer in texture and contain MSA tools.

In the second dry phase the rivers aggraded their beds to the height of about 45 metres from the present water level with very fine silt.

Probably the present climatic phase ensued at the beginning of the Holocene period, the early part of which was much humid. The country got covered with good vegetation and the silt of the second dry phase weathered into black brown soil. The LSA tools occur on the surface of this soil.

Dating

In the peninsular part of India, ESA tools are found along with the Middle Pleistocene fossil fauna, hence they are dated to the Middle Pleistocene [1]. The assemblage included well trimmed handaxes and cleavers along with crudely trimmed specimens and pebble tools. This industry, following the principle of archaeological dating that 'an assemblage should be dated by the most advanced tools rather than by more numerous primitive tools', can be attributed to the level where Acheulian handaxes appeared by the introduction of a new technique—'cylinder hammer'. The well made Acheulian handaxes along with cleavers having a biconvex cross-section and not a parallelogram appeared in East Africa at Olduvai Gorge in stage VII found from the base of Bed IV. The cleavers with parallelogramatic cross-section come there in stage VIII [2]. The ESA industry of India which

consists of cleavers, suggests " the direct spread of Acheulian tradition from Africa into India "[3]. The cleavers of parallelogrammatic cross-section indicate that ESA culture in India entered at the Stage VIII of the Olduvai Gorge. The Bed IV of the Olduvai Gorge is dated to the upper part of the Middle Pleistocene[4]. Hence it might be held that in India the ESA culture came in the upper part of the Middle Pleistocene or after that. Wainwright [5], who adopted the method of beginning with modern deposits and working back into the past, has dated the Acheulian tool bearing ESA gravel of Lower Narmada in Gujarat to the last Inter-glacial. Again, in the Potwar region the first assemblage of handaxes is dated to the late Middle Pleistocene [6]. Thus it seems more factual that the ESA culture in peninsular India entered the late or upper Middle Pleistocene or even at the end.

The occurrence of Abbevillian hand-axes and pebble tools along with fine Acheulian hand-axes suggest the survival of the old elements and techniques along with evolved technique.

MSA tools are also found in association with the Middle Pleistocene fossil fauna from the second gravel of the Godavari[7] and the Narmada [8]. However, it is likely that the fossil fauna of this gravel was late survival and therefore, it must be attributed to the upper Pleistocene, or according to our method of calculation late in the upper Pleistocene This industry might have evolved from the earlier culture.

LSA tools come from the surface of the river banks and the hills. They may belong to Holocene because of their association with the black soil.

NOTES

[1] Lake Philip, *Physical Geography*, Edition for India, 1959, 353.

[2] H. D. Sankalia, S. B. Deo, Z. D. Ansari and S. Erhardt, *From History to Pre-History at Nevasa*, 1960, 75-6; H. De Terra and Paterson, *Studies on the Ice Age in India and Associated Human Cultures*, 1939, 313-26.

[3] L.S.B. Leakey, *Olduvai Gorge*, 1951, 106. 117-120.

[4] K. P. Oakley, *Frameworks for Dating Fossil Man*, 1964, 224.

[5] L. S. B. Leakey, *Olduvai Gorge*, 1951-61, I, 1965, 43.

[6] G. J. Wainwright, *The Pleistocene Deposits of the Lower Narmada River and an Early Stone Age Industry from the River Chambal*, 44-45.

[7] T. T. Paterson and H. J. H. Drummond, *Soan, the Palaeolithic of Pakistan*, 1962, 95.

[8] *Op. cit.* [2], 105.

[9] *IAR*—1958-59, 27.

Megalithic Remains in the Aravallis

by PURUSHOTTAM SINGH

It was more than a century ago when Carlleyle reported megalithic graves from the northern fringes of the Aravallis. However, it was during the last two decades that their importance was emphasised, although no field work was done to ascertain their exact nature. Now that a few of the megaliths of the Kaimur ranges have been systematically excavated, it has become imperative to study similar monuments in the Aravallis in the light of this newly obtained data. With this idea in the mind the author explored the megalithic sites of Khera, Satmas and Daosa and noted their features besides collecting their photographic record.

Khera

The first group of megalithic monuments has been located in the Fatehpur Sikri range of the Aravallis. Here, seven cairns were located by Carlleyle [1] on the ridge of a hill at a little distance to the north-east of Khera, a village situated on the face of the hill, about 4 miles to the west of Fatehpur Sikri. He typologically divided these cairns in two categories, viz. flat-topped cairns and round topped cairns. In two round-topped cairns he found shallow, oblong trough-shaped cavity, roughly excavated in the solid rock of the hill. These contained a layer of pale-coloured earth or fine yellowish sand foreign to the locality. Below this layer of earth or sand, he found the grey dust of the ashes of calcined bones mixed with earth and a few small fragments of charred wood.

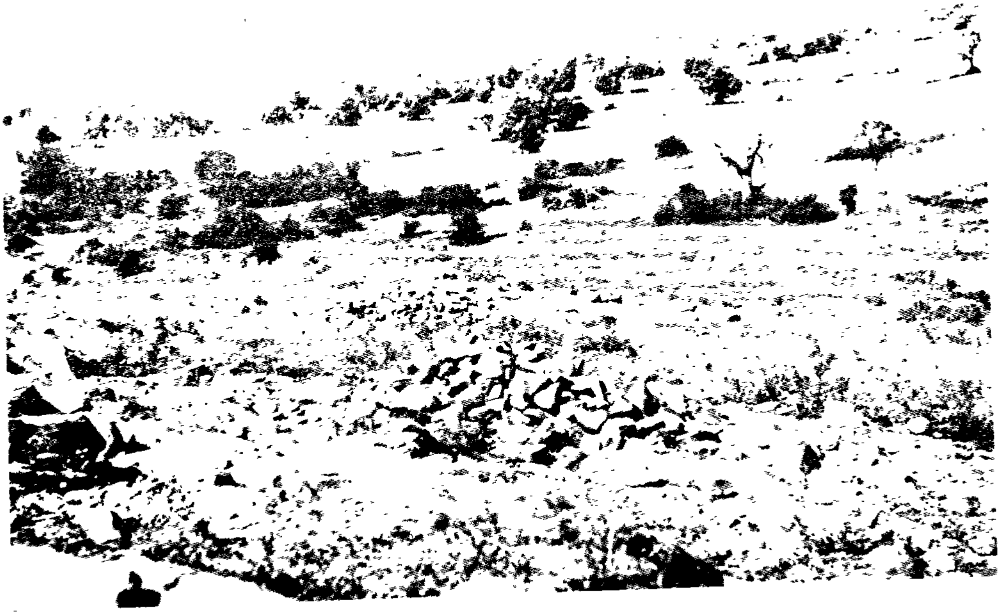
In another cairn of the flat-topped variety, he found a small square chamber. The chamber was found filled with stone rubbles and at the bottom was found the grey dust possibly of calcined bones mixed with earth and small atoms of charcoal.

In a recent visit, the present author located the seven cairns (Pl. VA) on the hill mentioned above. These cairns have an average diameter of 2.90 metres [2] and they rise to a height of nearly one metre above the surrounding rock-surface. The author was struck by the comparative freshness of the stone-rubbles used in those cairns (Pl. VB). If surface weathering of these rubble stones is any index to their antiquity, then the Khera cairns may prove to be of recent origin in comparison to those of Satmas and Daosa. However, much spade-work has to precede before such a relative chronology can finally be established.

Satmas

The next group of megalithic remains was located on the Satmas [3] hill at a distance of two miles to the north-east of Jagner which is situated at a distance of about 36 miles to the south-west of Agra and 18 miles to the south of Fatehpur Sikri. Here again, Carlleyle [4] had located a number of cairns or heaps of stones well over a century ago. He counted nearly thirty cairns on the slope of the hill, besides others, on the ridge of the hill. Some of these cairns were opened by him who typologically classified them in three categories.

1. Round-Topped or tumulus-shaped solid cairn below the level of which a shallow sepulchral trough had been excavated in the rock.
2. Flat-topped four-sided cairn containing a small square chamber at the bottom of



A. Khera : General view of the cairns on the western slope of the hill.

B. Khera : Close-up of a cairn.

PLATE VI

A. Satmas : Close-up of a huge cairn.

B. Satmas : A rectangular enclosure made of upright stone blocks.

the mass, but always in the body of the cairn and above ground.

3. Cromlech cairn. It contains a rectangular chamber within it, like a cromlech, only the walls are composed of loose rubble stones instead of slabs. Beneath this, a sepulchral chamber is hollowed out in the rock surface which is sometimes filled with small stones.

These three types of cairns differed in their size as well as in their methods of construction. The round-topped cairns generally measured 10 to 12 ft. in diameter. The chamber in the interior of the cairns was very small and if a complete skeleton had to be interred, it would necessitate the doubling up of a corpse in squatting position. The mean diameter of cromlech cairns is 6'6"×4' to 5'. These are 4'6" in height. The bodies were interred either whole or in fragments after cremation. Thus while flat-topped cairns yielded only small atoms of bones mixed with ashes, the round-topped cairns and cromlechs yielded a few fragile fragments of bones *in situ*. Carlleyle maintains that post-cremation burial as well as complete burial was in vogue at this place.

Besides the three types of monuments noted by Carlleyle, the present author, while on a visit to the site, located yet another type of monument. It consists of a small cist made of four stone slabs without any other lithic appendage (Pl. VIB). However, only one example of this variety was noted on the slope of the hill. An excavation of this type of monument of this site to throw valuable light on the mode of burial should be carried out.

Daosa

Another megalithic site of considerable importance is Daosa (Deosa), situated about 32 miles east of Jaipur on Jaipur-Agra road. Carlleyle had reported three types of monuments at this site. These are :—

1. Stone circles with a cromlech or a menhir in the centre.
2. Cairns and
3. Rude monolith.

Of these, the first group of monuments were located on the gently sloping ground to the north of the foot of the hill. The diameter of these four stone circles varies between 25 ft. to 16 ft. Some of the stone boulders were still in position [6] when Carlleyle visited this site almost a century ago. These boulders measured 3 to 4 ft. in height. One of these stone circles had a ' perfect cromlech ' in its centre. This cromlech was 6 ft. square and rose to a height of 4 ft. Its four walls were composed of 4 rough slabs of stone. The top of this cromlech was imperfectly covered by two narrow slabs of stone laid on and across it. The other two circles had monoliths or menhirs in the centre. Of these, one monolith was of considerable size, as it measured 21 ft. in length and 2 ft. in thickness. The monolith in the second circle was only 5 ft. in height. The fourth circle of stones did not contain any other monument in its centre. These cricles of stones were not subjected to excavation hence their precise nature could not be ascertained.

The second type of megaliths included several cairns situated to the north-east of Daosa village. Some of the cairns were opened by Carlleyle who found a few fragments of calcined human bones and a little charcoal and ashes thus establishing their sepulchral nature. The stone implements obtained from these cairns included a stone knife or dagger, a rude borer-like implement and a stone ball.

The third type of monument included a solitary rude stone monolith measuring 15 ft. ×4 ft. ×2 ft. and was still standing erect at a short distance to the west north-west of Daosa village. But no excavation was carried out at its base hence its exact nature could not be ascertained. The present author's work at Daosa revealed that two types of monuments, viz. cairns and a menhir

(Pl. VII) can still be seen on the site. The author located more than half a dozen cairns on the eastern slope of the outcrop situated on the south-eastern fringes of the modern Daosa town. The latter class of monument was represented by a solitary specimen (Pl. VII B). Other monuments mentioned by Carlleyle seem to have now been destroyed by the sprawling dimensions of the new Daosa town and its populace. Another noteworthy feature of this site is the occurrence of a few pottery sherds. The author was able to collect a few pieces of an ill-fired red ware from the vicinity of the cairns. Here it may also be mentioned that earlier explorers have reported cairns and cinerary urns from other places also in this range. Thus seme stone circles were seen by Garrick [7] at Kuchera near Nagaur and some cinerary urns containing human bones were discovered by Carlleyle [8] at the base of two large boulders in front of the rock which bears the Asokan inscription at Bairat. Besides an aboriginal tomb has been reported from the summit of a lofty range of hills at Machari[9] situated about 22 miles to the south of Alwar.

As has been pointed out earlier, the importance of the megalithic remains in the Aravallis was first of all realized by Wheeler [10]. That the cairns of the Aravallis are associated with the cult of the dead is amply clear by the description given by Carlleyle who has also recorded a tradition [11] about the construction of these graves. It says that these cairns mark the place where members of a royal marriage party were killed in ancient times by natural agencies like thunderbolts, lightning etc. or by decoits. Similar legends about these cairns has also been recorded by James Tod [12]. Here it is worthwhile to record that the Bhil of this region raise cairns over the graves of their dead even today.

Various types of megaliths have been reported from north-western India, Kashmir, Sind and Baluchistan. The importance of the megaliths of Aravallis lies in the fact that these are situated midway between the megalithic graves of the Vindhyan ranges of the one hand and Baluchistan on the other. Lastly, it may be pointed out that local people of this region are quarrying and destroying the rubbles on the hills of Satmas and Khera and there may not remain any trace of these graves after a few years. Therefore, an early excavation and study of these graves is a desideratum.

NOTES

[1] A.C L. Carlleyle, 'Report on a Tour in East Rajputana in 1871-72 and 1972-73' *Rep. Arch. S. rv. Ind.* VI, (1878), 13.

[2] Carlleyle notes that two or three of these cairns measured more than 10 ft. in diameter. However, the author could not locate any cairn with a diameter of over 10 ft.

[3] A.C.L. Carlleyle, 'Report on Agra', *Rep. Arch. Surv. Ind.*, IV, (Calcutta : 1878), 213-14.

[4] A.C.L. Carlleyle, 'Report of a Tour in Eastern Rajput na', *Rep. Arch. Surv. Ind.* VI, (Calcut a 1978), 33-39.

[5] A.C.L. Carlleyle, 'Report of a Tour in Eastern Rajputana'. *Rep. Arch. Surv. Ind.,VI* (Calcutta : 1878).

[6] As reported by Carlleyle. In a recent visit to the site the present author could not locate any circle of stone except a solitary menhir measuring nearly 3 ft. above ground.

[7] H.B.W. Garrick, 'Report of a Tour in Punjab and Rajputana in 1883-84', *Rep. Arch. Surv. Ind.*, XXII, 1887, 49-50.

[8] A.C.L. Carlleyle, *Rep. Arch. Surv. Ind.*, VI, (Calcutta : 1878), 100-101.

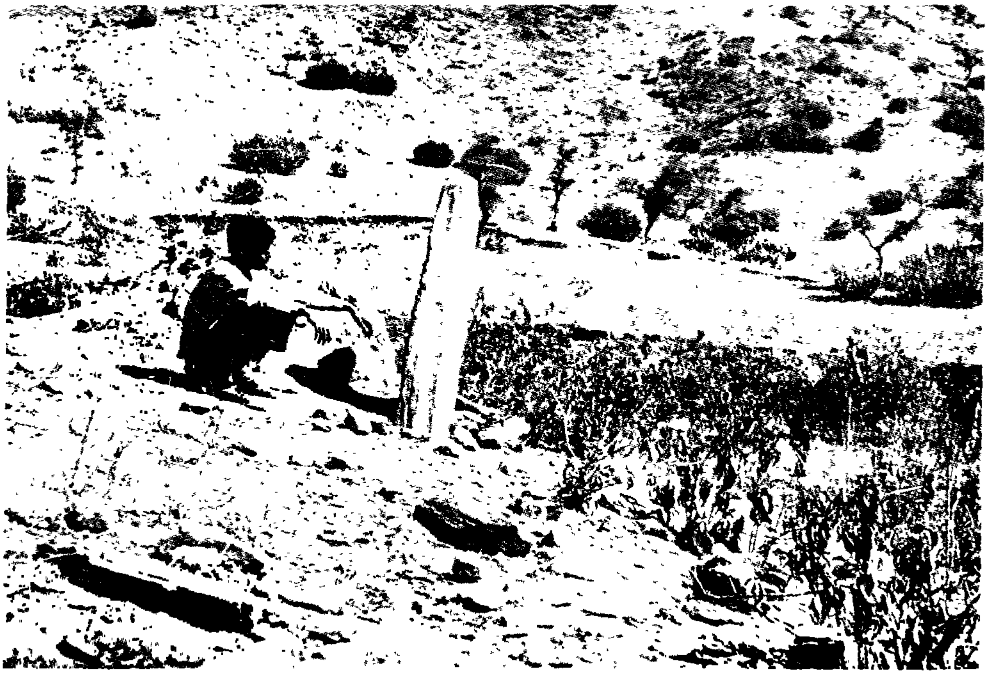
[9] A.C.L. Carlleyle, *Rep. Arch. Surv. Ind.*, VI, 88-89.

[10] R.E.M. Wheeler, 'Brahmagiri and Chandravalli : 1947', *Ancient India*, No. 4, 302 ff.

[11] A.C.L. Carlleyle, *Rep. Arch. Surv. Ind.*, IV, 214. Also Carlleyle, *Rep. Arch. Surv. Ind.*, VI, 33-39.

[12[James Tod, *Travels in Eastern India*. 30. Also his, *Annals and Antiquities of Rajasthan*, 648.

A. Daosa : General view of the cairns on the eastern slope of the hillock.



B. Daosa : Close view of the solitary menhir.

Crystal pendant from Rajghat.

Three Crystal Pendants of Identical Design

by P. K. AGRAWALA

Quartz crystal is a precious stone which has been widely used for making various artistic shapes and objects of aristocratic utility since chalcolithic ages. Here we wish to draw the attention of scholars to three crystal pendants discovered at Bhita, Rajghat and Sonpur. It is a striking fact that all the three pieces found from various sites show an identical design. They are so similar to each other that from the photographs one may be confused for the other if not examined with a great precising eye for minute details. The high attainments of Indian lapidarist's art are fully testified from these pieces which display a skilful mastery in cutting hard stones like crystal with so much precision and the intricate designing of a remarkably stylised figure to be seen on them no doubt characterises a highly developed art.

Of the three pieces, the one from Bhita was first to be discovered. It was found in the excavations done on this site by John Marshall in 1911-12 [1]. According to his description, it is a crystal pendant of Gupta date, with human face roughly incised on one side, and found from the trial trench 43 [2]. No further details are given by him as to its size and other characterising features which one would expect for this valuable piece. His dating of the object also seems to be just ' customary ' and without much reference as to its stratigraphic associatoins and nothing of stylistic sequence we can know from his report about the trench 43 except a few beads and the bricks of a crude structure which provide no hints to any specific dating.

The other pendant similar to the Bhita one is now in the Bharat Kala Bhavan. It is said to have come from Rajghat and was purchased from a local dealer. It has already been published by Dr. Moti Chandra in his *Kāshī kā Itihāsa* (Fig. 4, facing p. 80) with a caption saying, ' A female head, cut in crystal ; Śuṅga Period, B. C. 2nd century, Rajghat (Bharat Kala Bhavan).' We are thankful to the Director of Bharat Kala Bhavan for allowing us to have a photograph of it which is being reproduced here with due courtesy.

The third identical piece of this class has been recently found from the Sonpur excavations (1961-62), first published in the *Indian Archaeology* 1961-62—*A Review* [3] and also being described here along with a photograph by Dr. B. P. Sinha. It comes from Period II, datable roughly to B. C. 600—B. C. 200.

All these strikingly similar pieces have horizontal perforations on the upper portion in which a thread can be pierced. They are illustrated here as such on plates VIII & IX A & B. This shows beyond doubt their use as pendant and presumably they were worn in the neck as pectorals and as forming charm against evil. The upper projection bearing sidewise holes for the thread is beautified in all the three instances with the dentil motif.

An almost identical human face is to be seen on them. It represents a masterful sketch of the facial outline executed by incisions. It is rectilinear or somewhat rhomboid in shape. The hair is shown with suggestive scratches as meeting in the middle of the head and with a braid in the centre covering the forehead above the eyebrows which makes an impressive design for its contrast with the incised lines slanting inward from the two sides. The eyes are rendered with two arches for the eye-brows and with two dia-

mond-shaped patterns representing eye balls. The nose and mouth together are shown by a leaf-design placed with its taper upwards reaching the centre of the eyes. The effective stylised rendition of the human face is no doubt of outstanding merit.

Moti Chandra thinks [4] that the figure represents a female. Though there are no decisive indications in its figuration, a few arguments can be given as to its identity as a female. The arrangement of hair may suggest that it is a female shown which the parting of hair in the middle (*sīmanta*) as has been the fashion for an Indian lady blessed with *saubhāgya*. Further, an effiminate expression is to be observed in the rendition of the face which strikes in all the three examples. Whether the representation was intended to be that of a goddess or some female divinity of a lower status will be extremely doubtful if suggested.

Another striking feature of these objects are the two projections on either side of the lower portion. They appear as if pointed fangs of an animal, possibly of a tiger, were suggested by the artist. From examining the original specimen of the Bharat Kala Bhavan, we can say that there is hardly any thing which would lead us to identify some particular shape. They are simply fashioned as two pointed projections which may stand for tiger's fangs or claws or something similar. But their presence invariably in all the three instances appears to be with some specific intention by their artists.

No doubt, in Gupta inconography we find such details as flanking a pectoral worn by the certain Kārttkeya and Kṛishṇa images [5]. The ornament to be seen on the chest of these deities consists of a central round pendant enclosed between two nail-like things on either side. We are sure as to its identification. This type of amulet is still current as an efficacious charm worn round the neck of children and known as *baghanak* ('claw of the tiger') [6]. The projections to be seen in the crystal pendants possibly refer to the same type of representation. If so, their purpose as symbols of beatific nature will be significant. The practice of enclosing a central symbol by two flanking motifs can be traced back to the Śuṅga period. On the chest of a Yakshī [7], (labelled as *Chā(m)dā Yakhī*) from Bharhut, the torque worn round the neck displays in the centre a *śrīvatsa* which is flanked on either side by two spike shaped symbols. Though the identity of the lower side projections in the crystal pendants with these spike-shaped (or *aṅkuśa*) symbols on the chest of the Yakshī, cannot be argued, yet a similar suggestivity appears to have been in both the cases.

From the three crystal pendants under discussion, we have an idea how a motif of art was widely circulated over an extended territory as they were found separately from the excavations at different sites at various occasions. They appear as if 'cast from the same mould', if at all we are allowed to use this phrase for the pieces cut in crystal. They are so identical to each other (except their size) that one is provoked to have a view that they were possibly the works of a single artist and were exported to various distant places.

NOTES

[1] *Annual Report, ASI,* 1911-12, Calcutta, 1915, Pl. XXXII, 9.

[2] Ibid. 94.

[3] *I. A.* R.—1961-62, New Delhi, 1964, 4 Pl. IVA.

[4] Moti Chandra, *Kashi ka itihasa*, Bombay, 1962.

[5] Seated Karttikeya and Govardhanadhari Krishna, Bharat Kala Bhavan. Also see my ***Skand-Karttikeya—a Study in Origin and Development***, Varanasi, 1968, 80-2, and Pls. XVII b; also XVII a, XVIII a & XIX b.

[6] Ibid, 80-2.

[7] Illustrated by Dr. V. S. Agrawala in his *Studies in Indian Art*, Varanasi, 1965, Pl. III.

Crystal Human-Figure From Sonepur

by B. P. SINHA

Rock-crystal is a semi-precious quartz stone. In India its chief find-spots are Tanjore, Kalabagh, Kashmir and a few other places, where crystalline quartz of the requisite purity are obtained [1]. A leading authority has observed that the Alps and India are supposed to have furnished the ancients with their supplies of rock crystal[2]. From Jankara in Kathiawar, the bed of the Godavari near Rajmahendri, the stream beds of Tanjore and formerly even Delhi region, crystal prisms were obtained. Small bi-pyramidal cyrstals have been obtained from marls of the Mari in the Mianwali district of the Punjab, and are known as Mari diamonds.

Objects made of crystal have been in use in ancient India from the Neolithic times. Microliths made of rock cyrstal were noticed at Nagarjunakonda [3], Brahmagiri, and at later place continued in the early phase of the megalithic culture. In the Harappan culture crystal beads were manufactured. At Mohenjodaro a few short barrel-shaped and at Harappa one globular crystal bead were found [4]. The occurrence of lump of crystal ready to be cut for beads at Chanhudaro [5] shows that crystal beads were manufactured locally here. The occurrence of only one perforated short bead at Rangpur III [6] associated with lustrous Red Ware tends to suggest that crystal bead making was not much popular in post-Harappan chalcolithic cultures of western and central India. In the Black-and-Red Ware chalcolithic complex at Oriup (Bihar), were found a few cyrstal beads. Those have to be dated latest before 6th century B.C. In Jaugada, District Ganjam, crystal beads with Black-and-Red Ware (Period-I) but associated with iron may be noted [7].

With the emergence of NBP, use of crystal products becomes again popular. From Hastinapura were found in Period III (NBP) crystal beads, and one pyramidal shaped pendant from Period IV [8]. Crystal beads of Period II (NBP) from Ujjain, and from NBP levels of Vaiśāli may be noted [9]. Taxila yielded a large number and of a variety of crystal objects. NBP stratum (IV) at Bhir mound yielded a star of highly polished crystal [10]. Crystal beads were manufactured in all periods in Taxila.

However, a unique crystal object, in course of excavations, was discovered at Sonepur in the Gaya district in Bihar in the NBP stratum (Period II) [11]. This is a tiny human face of a female, well-finished (slightly damaged on the right side), horizontally perforated on the top of the head. This was probably used as a pendant. What does the figure indicate ? This can only be speculated. It must have had some religious or magical significance. It may be of some interest to know that in Bihar even today a married woman, who is the second wife (after the death of the first wife) of a husband has a stone pendant or a metal (silver) pendant hanging on her chest, probably as a mark of respect to the dead co-wife, or to ward off any evil from her spirit.

The artistic quality of this crystal piece has to be noted. The depiction of the eyes and eye-brows, and the very proportionate figure of the face with porminent nose and lips have been beautifully cut into the hard rock. We get an idea of the hair-dress of the longish faced woman. The extension on the both sides from the head of the figure suggests that the head of the woman was covered by *odhani* like thing. Thus some

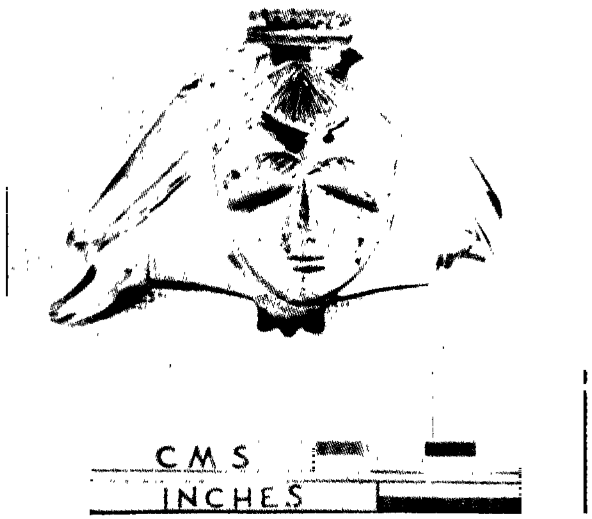
idea about the dress of the time may be also obtained.

But the importance of the figure lies in its being so far the only known example of its kind for such an early period. We do not know any such or similar crystal human-figure having been found in stratified layer belonging to the NBP period. That the art of the stone-cutter had reached the same degree of excellence as that of the potter in the period in Bihar is a legitimate conclusion.

NOTES

[1] D. N. Wadia, *Geology of India*, London, 493.
[2] J. Marshall, *Mohenjodaro and the Indus Civilization*, II, London, 1931, 678.
[3] *Indian Archaeology*, 1958-59, 5, 1959-60, 6.
[4] *Ancient India*, No. 4, 252.
[5] E. Mackay, *Chanhudaro Excavations*, 1935-36, 209.
[6] *A. I.* No. 18-19, 144, Fig. 52, Pl. XXXIV—4.
[7] *I.A.*R. 1956-57, 30.
[8] *A. I.* No. 10-11, 92-94, Fig. 29.
[9] *I.A.*R. 1957-58, 36; Krishna Deva, *Vaisali Excavations*, 62, Pl. XXIV, No. 17.
[10] J. Marshall, *Taxila*, I, 102.
[11] *I. A.*R., 1961-62, 4.

A



B

C

A. Crystal pendant from Bhita. B. Crystal pendant from Sonpur. C. Sealing from Musnagar.

A B C D

[illegible] from Nānda. The lowest figures in A, B, C, & D are those of *Vishnu*, *Ekanamsa* or *Lakshmī*, *Vāsudeva* and [illegible] plough, respectively.

Chaturmukha Śiva-Linga from Nānd, near Pushkar, Rajasthan

by R.C. AGRAWALA,

This is to discuss the important discovrey of a life-size and four faced Śiva-*liṅga* in white spotted red sand stone. Under worship in a field at Nand, near Pushkar in district Ajmer of Rajasthan, it was briefly noticed by me in the B.C. Bhattacharya Volume of the *Journal of Oriental Institute*, Baroda, Vol. XIV, 1965, pp. 388-391. The colossal *liṅga*, datable to 2nd century A.D., was excavated further and it revealed very unusual iconographic peculiarities. It is carved in four horizontal tiers, on each of the four sides facing the four cardinal directions. The lowest portion represents *Vishṇu Bhāga* so as to depict carvings of Vishṇu (Pl. XA), goddess *Ekānaṁśā* (Pl. XB) along with Vāsudeva and Baladeva (Pl. XC&D). Further up may be identified portions representing Brahmā (?), Sūrya and śiva respectively on all the four sides; they are somewhat mutilated. One one side of Sūrya portion, we even find the male deity (i.e. Sun) putting on a Scythian type of conical cap on his head and lotus stalk in the right hand (Pl. XB.). The topmost portion of this *liṅga* is now covered, on four sides, with headless representation of *ūrdhvaretas* Lakulīśa, seated in squattish pose as also evident in most of the Kushāṇa sculptures from Mathura. The impact of Kushāṇa art traditions on this *liṅga* is further confirmed by the carvings of typical Kushāṇa type of crowns and right hands raised up in *abhaya* pose, in most of the male figures and, on all the four sides of the pillar like *liṅga* under review. This is how it reflects the syncrorism of Brahmā-Vishṇu-Sūrya and Śiva in one at such an early stage. The squattish pose for Lakulīśa on all sides of Nānd *Liṅga* above is also interesting and important.

The Śiva-*Liṅga* from Nānd, in Rajasthan, is decidedly an important relic in the realm of early Indian art. Another specimen of this type has not been discovered as yet. In the Nānd-*liṅga*, under review, we notice all the figures as emanating from those carved in the lowest panel as also in the *Viśvarūpa* Vishṇu from Bharat Kala Bhavan, Varanasi. The former is quite different from the contempory four-faced-*liṅgas* of Mathura art and preserved in the National Museum [2] at New Delhi and Municipal Museum at Allahabad.[3]

Even the famous Bhīṭā-*liṅga*, now exhibited in State Museum at Lucknow, fails to present the details represented by the column-like *liṅga* from Nand, in Rajasthan. It is therefore evident that there did exist various types of Śiva-*liṅgas* during the Kushāṇa period. Elsewhere, in one specimen from Mathura itself, we notice only four-armed Śiva standing against the column-like phallus and twisting his matted locks round it with his raised up upper hands.[4]

The aforesaid column like *liṅga* from Nānd thus appears to depict the earliest extant form of four-faced Śiva Liṅgas which may present the blending of four principal Brahmanic deities into one; it may well be regarded as the predecessor of *Śiva-liṅgas* of early-mediaeval and mediaeval periods. Lakullṇa was later on substituted by four Śiva-heads on top of the *liṅgas* whereas standing figures of Brahmā, Vishṇu, Sūrya and

Śiva came to occupy the remaining portions of the same *liṅga* as in a 7-8th century *Chaturmukha-Liṅga* from Kalyāṇpur[5] (Rajasthan) and elsewhere.

The Nānd *Liṅga* has also got an important bearing on the antiquity of Lakulīśa cult in Rajasthan. Here we notice only the figures of Lakulīśa[6] on all the four sides above; he is shown as seated in the squattish pose which was quite popular at Mathura during the Kushāṇa period. Later on, we come across Lakulīśa usually in *pādmasana* [7] pose as in the sculptural art of Western India. Independent images of squattish or seated Lakulīśa as such are of course yet to be discovered in the realm of Kushāṇa art though we do some across a number of Kushāṇa carvings of *ūrdhvaretas* Śiva from Mathura and its vicinity. Viewed in this light, the aforesaid Śiva-*liṅga* from Nāṅd is really of great interest for the students and scholars of ancient Indian iconography and cultural history. It is hoped that expertsof Indian art and literatuer will throw more light on some of the important and unusual iconographic features represented therein. It is in fact a very rare specimen in the domain of early Indian art.

NOTES

[1] Photographs have been prepared by Mr. Vijaya Kumar and kindly supplied by the Director, Archaeology & Museums, Rajasthan., Jaipur. I am thankful to Dr. Satya Prakash as well.

[2] Published by R.C. Agrawala in *East & West* Rome, XVII, (3-4), 1967, 276, figures 1-2.

[3] An unpublished specimen.

[4] A. Coomaraswamy, *History of Indian & Indonesian Art*, London, 1927, figure 68; R. Sen Gupta's paper in *JAS*, Calcutta, IV(2), 1962, 41-47, plate IV B. It recalls)o our minds the famo us *linga* from Gudin.all am, depicting standing Siva against the phallus in the art of first century B.C.

[5] R.C. Agrawala, *Sculptures from Udaipur Museum*, Jaipur, 1960, Plate XV.

[6] All the heads of *Lakulisa* in this *linga* are completely mutilated. It is therefore difficult to hazard any opinion about the exact nature of Siva heads facing two cardinal directions.

[7] R.C. Agrawala, *Journal of Oriental Institute*, Baroda, XIV, 1965, 388-91 for standing Lakulisa from Western India.

A Neolithic Burial from T. Narasipur

by M. SESHADRI

In the summer of 1961, during the excavation of the ancient site on the left bank of the Cauvery at T. Narasipur Sangam, conducted by the Archaeological Department of Mysore a burial of the Neolithic Culture was uncovered in TN 16 (Pl. XI) well within the habitation area. It is an extended burial in a roughly oblong cradle-shaped pit, having its major axis in the east-west direction. Two post-holes were seen, one on either side of the oblong burial-pit cut into layers 5 and 6 (Pl. XII A). The body was lying on its back, with the head towards east and the crossed hands placed on the abdomen. The face was slightly tilting to the right. The legs were stretched. Two large grey ware pots with globular body and everted rims were placed near the head. These were hand made and slightly burnished. There was also a shallow lipped bowl and a pottery "neck rest" (head-rest) near the head itself. The pit containing the body and the funerary offerings (Pl. XII B) was filled up with the same soil gathered during its digging. There was no stone or any such appendage to indicate the burial pit. The purpose of the post-holes could not be made out.

The skeleton had undergone much post-mortal deterioration. However, a careful study, after reconstruction of the skeleton, by Sri K.C. Malhotra, the Anthropologist of the Deccan College, Post-Graduate Research Institute, Poona, has given sufficient data relating to the racial features. His study has revealed that the skeleton is of a woman aged about 21-25 years belonging to the Mediterranean stock. The individual possesses a medium-sized high-vaulted head, long face, feebly developed supra-orbital ridge and occipital torus, slightly sub-nasal prognathism and medium cranial capacity, i.e., abcut 1,300 C.C. The stature has been estimated to be about 5'2". The present fiind shows a good deal of similarity with the other neolithic human skeletal remains of the Deccan: Piklihal, Tekkalakota, and Nagarjunakonda. It is possible that the people responsible for the neolithic cultural phase in the Deccan possessed a uniform pheno-type, i.e., Mediterranean and possibly whatever differences are depited are largely due to admixture. How it is different from those of the cholcolithic skeletal series such as Nevasa, Mohenjodaro and Harappa and the megalithic of southern India such as Adichanallur, Brahmagiri, Yeleswaram has to be ascertained.

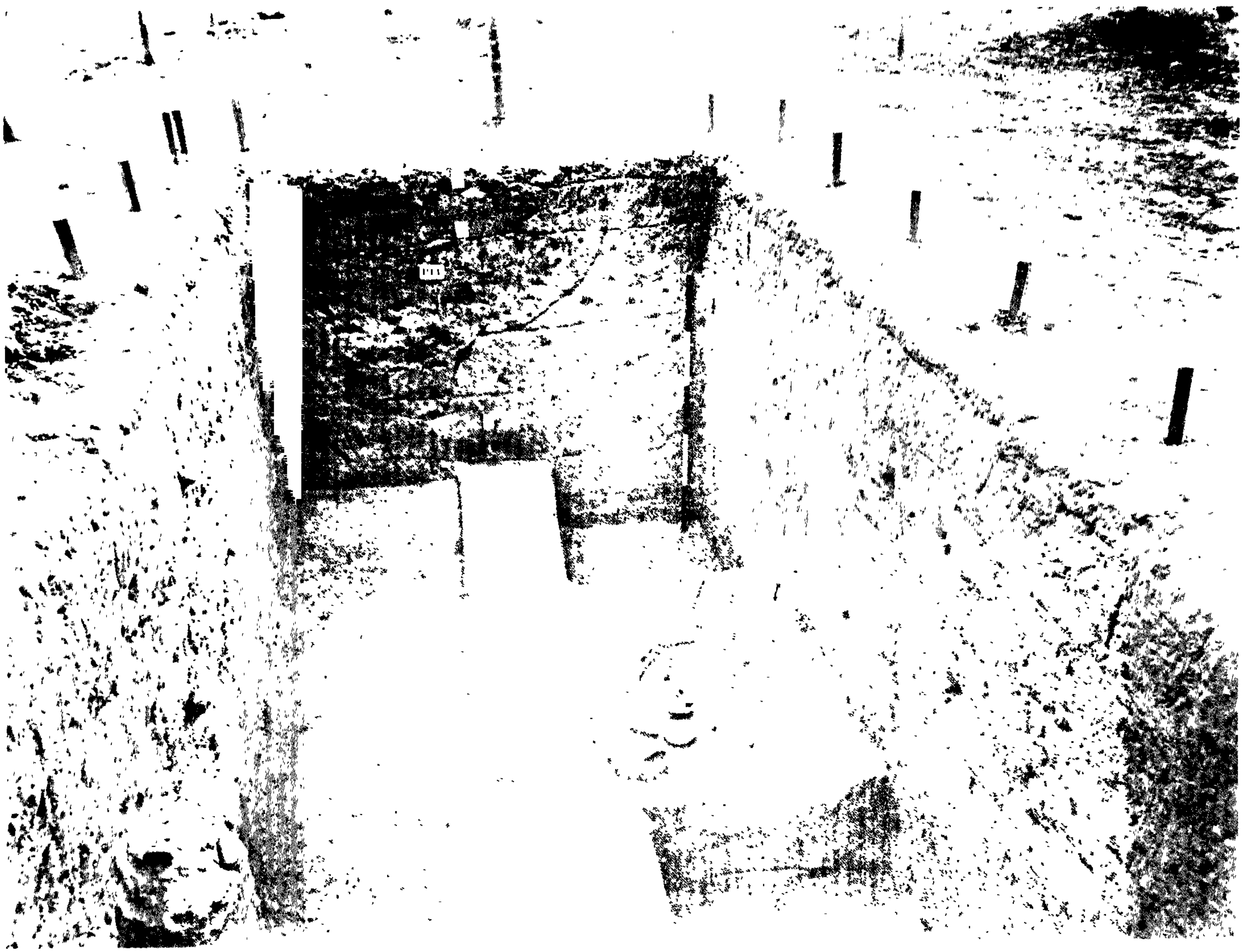
Some of the modern communities of Karnataka such as the Ādikarnataka, Agasa, Gāniga and Brahmins like the Babburkamme bear certain physical characteristics similar to the T. Narasipur specimen. An examination of the teeth of the present skeletan has revealed that the individual was suffering from caries. This is probably the earliest evidence of the existence of that disease, so common in India today.

On archaeological evidence the present burial is assignable to about the first half of the 2nd millennium B.C.

The T. Narasipur burial presents some features of its own. Majority of the neolithic burials and the chronologically-nearer chalcolithic, extended, adult ones of the Deccan have a north-south orientation unlike the one from T. Narasipur. In many of the burials at Brahmagiri, Nagarjunakonda and Piklihal, a spouted pot is normally associated, but it is absent here. If any libation was poured out, the lipped-bowl

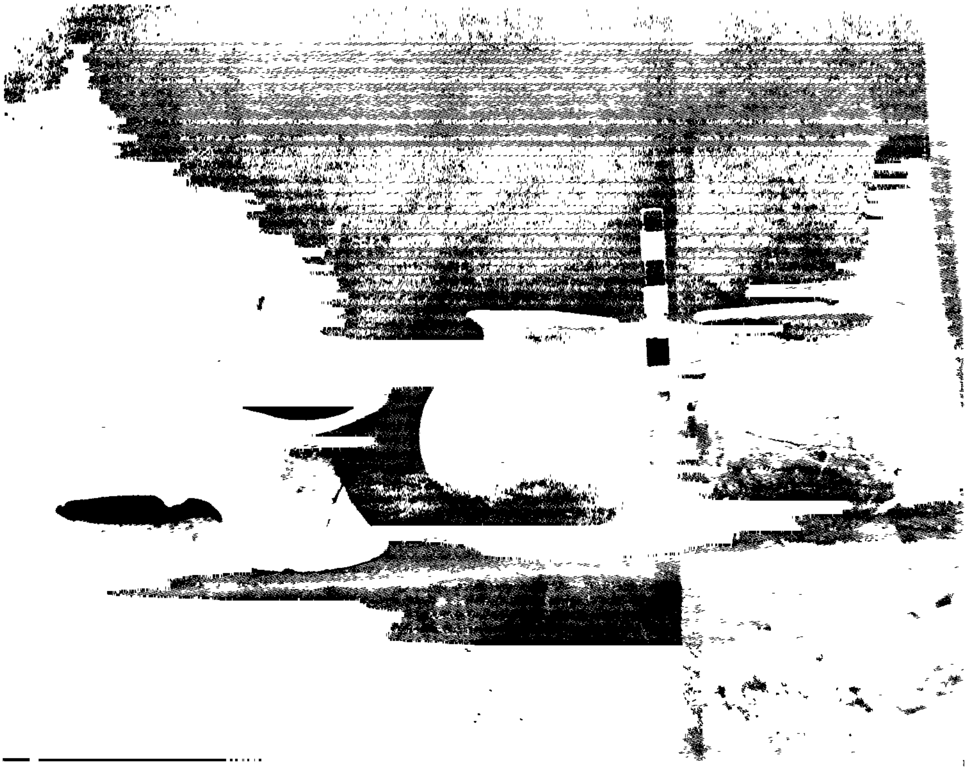
was used for that purpose. Apart from the orientation, the attitude and the position of the hands too are somewhat peculiar. The burial, further contains a terracotta 'neck-rest'. The presence, in the burial under study, very near the head (temple) shows that this might have been used as a 'head-rest'. Allchin has already drawn attention to the use of varieties of head-rests in many of the modern primitive communities of South-East Asia and Africa. He has also pointed out that head-rests, almost similar to the T. Narasipur type, were widely in use in the Nile valley right from pre-Dynastic times down to the Roman period. While wood, stone and metal ones were popular, pottery ones, too, are not unknown there.

Pottery head-rests, are hitherto known in India only in the Neolithic of the Cauvery Valley. Can the occurrence of similar ones in the Nile region be a pointer towards the solving of the problems of the origin of the Neolithic Culture of South India?



General view of an excavated trench at T. Narasipur (Mysore).

A. Burial pit with skeleton and pottery at T. Narasipur.



B. Grave-goods associated with the burial from T. Narasipur.

An Interesting Sealing from Musanagar

by KIRAN KUMAR THAPLYAL

The terracotta sealing discussed below comes from Musanagar (80°10′ N. and 79°58′ E.) [1], a small town in Kanpur District, thirty-four miles from Kanpur and now in State Museum, Lucknow [2]. The antiquity of Musanagar as well as its archaeological importance is well known since long [3].

The sealing is of greyish colour and broken on the right side. The extant portion measures 4 cms. in length and 3.5 cms. in width at the maximum points (Pl. IX C). Its original size, however, is a matter of conjecture.

The sealing shows in high relief two bulls standing beside each other and facing right. The one in the foreground covers much of the second figure and is shown either in a belligerent mood or rubbing its head against a tree trunk with the tail slightly raised suggesting excitement. There are some saddle-like marks on the back of the bull recalling to mind the saddles on the back of some of the animals on Harappan seals. The other bull stands placidly facing towards the same direction.

There are two objects—in between the fore and hind legs and another between the two hind ones. The former is domical in shape. If any religious significance is to be attached to it then the object in the context of the bull might stand for a *linga*. Else the two objects may be treated as stones depicted in order to heighten the effect of the landscape.

The part of the seal having the delineation of the trunk of the tree is broken and missing. The way leaves have been depicted above the head of the bull in the foreground gives the impression of a banana tree. Leaves and a flower or fruit [4] have also been shown from the branch above the back of the bull in the background. It may be suggestive of banana leaves and flower or another branch of some tree.

The sealing bears some figure indistinctly drawn on the left of the two bull figures which cannot be positively identified. However, the plausibility of another animal figure facing front cannot be denied.

There is a deep groove lengthwise on the back of this sealing suggesting its use for sealing letters parcels, or documents. Whether the sealing is of local origin or came from outside is difficult to ascertain.

As regards the date of the sealing there is nothing to fall back upon except its stylistic consideration, as it is just a chance discovery. In the museum records it has been ascribed to' C. 5th or 4th century B.C. '[5]. A comparison of this sealing with its counterparts of the historic period tends to show that there is hardly any similarity between the two. The very mode of depicting the two bulls in perspective—one in the foreground and another in the background is a proof of the remarkable skill and understanding on the part of the artist rarely to be seen on the latter ones. Of the bulls it was the humped variety that was favourite of the artists of India throughout its art-history. We may, however, note that taken individually, there is some similarity between the bull and tree figures on the seal and the ones depicted on a few of the Harappan seals [6].

In the present state of our knowledge about the antiquity of the site Musanagar [7], it would be premature to assert with certainty about the protohistoric affinities of this sealing purely on stylistic grounds. Yet we may recollect that the find of a few stray seals in India has been startling in as much as they have been treated as evidentiary links between India on the one hand and Mesopotamia and Crete on the other. The cylinder seal in Central Museum, Nagpur (datable to c. 2,000 B.C.) [8] and a cylinder one from Maski [9] point to Indo-Mesopotamian contacts while a button seal unearthed recently from Pandu Rajar Dhibi (West Bengal) has been taken to suggest Indo-Cretan contacts in the second millennium B. C.[10]. Recent explorations and excavations have widened the extent of Harappa culture considerably. Now when Harappa culture has been traced at Alamgirpur (District Meerut) and even further east and Harappan traits have been suspected at Kausāmbī, if a seal suggestive of protohistoric affinities is found at Musanagar, the find should appear less startling than the ones enumerated above.

The belligerent mood of the bull in the foreground provides a good contrast to the placidity of the other. The bull figures have been carved in high relief in contrast with the tree which has been done in low relief. The two small dome-shaped depictions balance the composition by filling the empty space while the tree and its branches provide a nice border on the top and right. The sealing is remarkable for the skilled depiction of the bulls as well as the tree individually as also for the composition as a whole.

Acknowledgement

The author expresses his gratefulness to the authorities of State Museum, Lucknow, for providing facilities for study and supplying photograph of the seal.

NOTES

[1] H. R. Nevill, *Cawnpore, A District Gazetteer*, XIX, 1909, p. 312.

[2] No. 55, 258.

[3] *Op. cit.* [1], 312.

[4] Apparently these look like Brahmi letters *ra* a *ma* but a careful observation shows that they are hanging from the branch.

[5] *Consolidated Report on the Working of the State Museum, Lucknow*, 1960, 194.

[6] For bull in the foreground J.J. Marshall, *Mohenodaro and the Indus Civilization*, III, Pl. CX, no. 323; for the bull in the background, M. S , Vats, *Excavations at Harappa*, Pl. XCI, nos. 241 and 245; for tree, J. Marshall *Op. Cit.*, Pl. CXI, no. 352; Ibid, Pl. XCII, no. 3 (painted on pottery); M. S. Vats, *Op. Cit.* Pl. XCII, nos. 327 and 328; E., Mackay, *Further Excavations at Mohenjo-daro*, II, Pl. XCI, no. 4A.

[7] The tradition, however, asserts that the temple Muktadevi on the site was built in the *Treta Yuga* (Vide H. R. Nevill, *Op. Cit.*, 313). No finds of the protohistoric period have been so far been reported.

[8] M. A. Suboor, 'A Note on the Babylonian Seal in Central Museum, Nagpur', *Jr. As. Soc. Beng.*, X, no. II, N. S., 1914, 461-63, figs. 1-3.

[9] B. K. Thapar, 'Maski 1954 : A Chalcolithic Site in the Southern Deccan', *Ancient India*, No. 13, 1957, 9, 21, 24 and n.

[10] M, Ridley, *The Seal of Aetea and the Minoan Scripts* 1963, (the pages have not been numbered).

Some Ancient Sketches In Khajuraho Temples

by DEENABANDHU PANDEY

The present note is intended to bring to notice the sketch drawings of the Khajuraho artists. Apart from the line drawings for the unfinished foliage designs depicted on the temples and plan and elevations of the temple on the floor of the *Mahāmaṇḍapa* of the Duladeva temple, there are certain interesting sketches of human and animal figures. In total, I noticed the sketches at six places. Out of these the human face of the steps of the Mātangesvara temple, the elephant on the north *Kakshāsana* of Vāmana temple and the peacock and birds on the *garbhagriha*-floor of the temple lying south of the Viśvanātha temple have been drawn in the recent past as there execution shows. Some lines of the fragmentary cela near Kandarīya temple may be of ancient days.

The most important are the sketches of the Lakshmaṇa and Devījagadambī temples. Out of the two sketches from the Lakshmaṇa temple the first one is engraved on the south plinth-wall near the eastern corner. It is an erotic picture in *paśu āsana* where the sexual intercourse between a boar and a lady is depicted [1]. Nearby it are some fishes. The boars are noted for their long-time sexual enjoyments. The second picture is also an erotic scene where a man and woman are depicted in standing pose [2]. There the lady is upside down whose legs are within the arms of the man who is trying to intercourse from the back side. The bust portion of the lady is not executed. Her left arm holds the right leg of the man and the right arm is not drawn. The face of the man is drawn in typical Khajuraho style. This picture lays on the floor of the plinth at the south west corner.

The third figure is of a person running with a lotus bud in his right hand depicted on the floor of the Mahāmaṇḍapa of the Devījagadambī temple at the north-east side-passages. The full momentum of the body is seen in the hands and legs of the man. Unfortunately the upper portion of the body is not drawn by the artist.

These sketches add something new to the known art traditions of Khajuraho.

NOTES

The author is indebted to Shri Lakshmi Kant Tripathi, Reader, Deptt. of A.I.H.C. & Arch., B.H.U. who gave him an opportunity to accompany him while his tour to Khajuraho in the Durgapuja, 1967, when he took the pencil impressions of the line drawings.

[1] It was first noticed by the author during his educational tour in 1965, organised by the Deptt. of A.I.H.C. & Arch. ,B.H.U., Cf. *Yatra ke Dina,* the tour diary submitted in part fulfilment of the Degree of Master of Arts, Deptt. of A.I.H.C. Arch., B.H.U., 1965, (unpublished).

[2] This type of *asana* is not mentioned anywhere in the literature.

ARCHAEOLOGY IN UNIVERSITIES

DECCAN COLLEGE POST-GRADUATE AND RESEARCH INSTITUTE, POONA

Since 1939 the Deccan College after it was re-started as a Post-graduate & Research Institute, has kept before it the aim of obtaining links between Pre-history and Proto-history and between Proto-history and Ancient Indian History. This was to be attempted through

(a) a study of ancient Hindu, Buddhist and Jain literature ;
(b) archaeological explorations and excavations ; and
(c) a study of the existing archaeological monuments.

In pursuance of these aims, the Deccan College began to conduct regional explorations in Maharashtra and with the encouragement given by the Government of India, it started explorations in Gujarat in 1941. Since then, the field has been enlarged to cover almost the whole of India and now during the last 28 years, parts of Maharashtra, Mysore, Andhra, U.P., M.P., Rajasthan, Karnatak and Punjab (old) have been explored by the members of the staff and post-graduate students of the Deccan College. In this work, the Institute has also obtained co-operation from the Universities of Bombay, Baroda, Karnatak and the States of Andhra, Mysore, Gujarat, M.P. and Rajasthan.

Over and above the explorations, the Institute has conducted excavations in Gujarat, Maharashtra, Mysore, Andhra, M.P. and Rajasthan. The results of these have been published. As a result of both these exploarations and excavations, the important links between Ancient history and Proto-history and between Pre-history and Proto-history, have been obtained for all these States mentioned above. In fact, we have obtained for the first time the pre-and proto-history of many of these regions.

The study of ancient monuments and the archaeology of the Deccan was completed in 1947. It was followed up by a detailed study of the Ajanta monuments entitled '*Life Depicted in the Ajanta Paintings*'. This was followed by another study, viz. '*The Study of Sanchi Monuments*'. Likewise, a study has been completed of the archaeology of three districts of U.P. and Nepal. Detailed studies have also been completed of the temples and iconography of Karnatak and Andhra.

A detailed study of the Jain literature has been completed, as also of the *Vāyu Purāṇa*. The work is proceeding on the *Agni Purāṇa*. Inscriptions have not been neglected. Historical Geography & Cultural Ethnography has been reconstructed by a study of the inscriptions of Gujarat, Maharashtra, Mysore, M.P., U.P., Rajasthan and parts of South India, viz. the Pallavas and Cholas.

After the University Grants Commission established the Department of Archaeology in the Poona University, the Institute has been able to build up an archaeological laboratory and scientific studies have been undertaken of the soils, river gravels and pottery collected from explorations and excavations. As a result of all these excavations/explorations, an up-to-date study museum has been created at the Deccan College.

—H. D. SANKALIA

UNIVERSITY OF MADRAS

The Ancient History and Archaeology department, University of Madras has taken up a scheme to find out archaeological evidence for the early history of the Lower Kaveri basin, particularly in the District of Tiruchirapalli. In pursuance of this scheme it carried out intensive explorations in the region during the last eight years from 1960 onwards, and has excavated at three sites so far :

(*a*) Tirukkampuliyur 35 miles west of Tiruchirapalli on the south bank of the river Kaveri where excavations were conducted for two seasons in 1962 and 1963.

(*b*) Alagarai, some five miles down the river on the opposite bank of the river where digging was done for one season in 1964 and

(*c*) Uraiyur, the old Chola Capital, and now within the Municipal limits of Tiruchirapalli on the south bank of the Kaveri and east bank of the stream Kodamurutti where excavations were made for three seasons during 1965, 1966 and 1967.

These continued investigations show that the first occupation of the region started in early historical times by an agricultural community making use of iron and the black-and-red and russet painted wares along with other associated wares. That rice was one of their staple food grains is proved by the occurrence of paddy husks in large quantities found in the lower levels. The occurrence of post-holes without any brick construction but associated with floor levels suggests that they lived in temporary huts probably covered with thatch. They decorated their person with beads made of terracotta, semi-precious stones, shells and rarely of paste and glass, bangles of shell etc. Their children were provided with crude clay toys.

The habitation at Tirukkampuliyur yielded, in its earliest phase, the evidence of elaborate use of painted black-and-red ware as also the russet coated painted ware which in course of time was followed by plain black-and-red ware.

The inhabitants of this period at Alagarai have left behind, besides the above traits of civilisation, a few inscribed sherds with Brahmi characters, one of which may be reconstructed to read, '*Kuttan*' meaning in Tamil, a dancer. Palaeographically the letters are very similar to those from Arikamedu and hence datable to the first or second century A. D.

The next site at Uraiyur yielded the additional evidence of a large number of inscribed sherds with Brahmi characters of the same antiquity, one of the inscriptions containing thirteen letters reading *Muppōn pēḍu Antāṇ.miṉṟumāṇ* thus establishing that in the early centuries of the Christian era the Brahmi script was widely used for writing Tamil not only for engraving inscriptions in caves found in a number of places in South India but even for popular purposes like writing on potsherds in the houses of ordinary folk. Another significant fact that emerged from the diggings even at the interior site of Uraiyur is the evidence for contact with the Roman traders. Considerable numbers of rouletted ware sherds were found in the levels contemporaneous with the levels yielding the sherds with Brahmi characters and thus providing additional evidence for dating those levels to the early centuries of the Christian era. The discovery of a brick-built dyeing vat in these levels would underline the prevalence of the textile industry in which the Roman traders are known to have been engaged. Towards the end of this period occurred the evidence for the destruction of the

site by floods in the river Kaveri which fact has been borne out by literature and epigraphical records of medieval times.

This first cultural period in this region came to an end with the emergence of a red slipped ware culture displacing to a great extent the earlier black-and-red ware culture. All the three sites yielded evidence of an enriched cultural equipment, in the form of mud-brick and burnt-brick residential structure with rammed structure, elaborate use of ornaments of varied types like beads made of glass, paste, shell, and semi-precious stones bangles of glass and shell, use of terracotta animal and human figurines probably some as toys, but others for cult purposes.

The large burnt-brick structure at Tirukkampuliyur, though found in ruins, revealed two rooms and a wide verandah, also exhibiting evidence of renovations more than once. The circular rubble-and-brick structure at the same site might have served as a storage bin for grain.

The occurrence of a large number of rammed floors in association with brick-and-stone debris at Uraiyur in comparable levels would indicate similar building methods at Uraiyur, in contemporary times.

All the sites, again, entered a new cultural period, the third period which was characterised by the use of an ill-fired crude red ware and marked the advent of the medieval period in South Indian history. The other cultural equipment remained more or less the same, though changes in details are noticed in many cases. But since these levels were much disturbed in all the sites not much can be said with certainty regarding the building methods, ornamentation and such other details.

—T. V. MAHALINGAM

UNIVERSITY OF SAUGAR

The Department of Ancient Indian History, Culture and Archaeology, University of Saugar, has been conducting excavations and explorations regularly since the year 1960-61. Excavations were undertaken at Eran (dist. Sagar of Madhya Pradesh) for five seasons (1960-61 to 1964-65). In the year 1965-66 the department conducted excavations at Tripuri (near Jabalpur) jointly with the Deccan College, Poona, and the M. S. University, Baroda. During the last two years the department has continued the work at Tripuri independently.

The results as obtained at the two excavated sites are briefly given here :

Eran

Eran (ancient *Airikina*), 8 miles to the south-east of Bina junction of the Central railway, stands on the southern bank of the river Bina (ancient *Veṇva*), a tributary of the Betwa. The mounds at Eran had already yielded important archaeological material in the form of coins, inscriptions, sculptures and architectural fragments. The excavations conducted during 1960-65 revealed here the existence of four main cultural periods. On the basis of the associated finds and carbon-14 dating, the chronological evidence has been found as follows :

Period I (1st quarter of the 2nd millennium B.C. to c. 700 B.C.)

Period IIA (c. 700 B. C. to c. 200 B. C.)

Period IIB (c. 200 B. C. to 1st cent. A. D.)

Period III (c. 1st century A. D. to 6th century A. D.)

Period IV (—Late Medieval upto about 1,800 A. D.)

The culture-equipment and important finds of the respective periods are described below :

Period I—This is by far the most significant period in the history of eastern Malwa, revealing the culture of the chalcolithic people. These people manufactured beautiful wheel-made painted pottery of a high type and used microliths, copper and neolithic implements. The pottery of the period includes the red ware, painted in black; coarse red ware, usually with white incised decorations; Black-and-Red ware, painted in white over the black interior; and grey ware, mostly painted in black. The finds of the period included terracotta figurines, beads, two fragments of copper celts and a thin round gold piece. The discovery of a mud defence wall and a moat is significant. The mud wall, made of black and yellow clays, enclosed the semi-circular habitation of the town from the south, the other three sides having been enclosed by the river Bina.

Period IIA—The period, beginning with the early historical time, is marked by the introduction of iron and the occurrence of Black-and-Red ware and a few sherds of N.B.P. A circular lead piece bearing the legend *rañо Indagutasa* in the Asokan Brahmi characters was discovered, bringing to light the name of a new king Indragupta, who ruled in eastern Malwa in the beginning of the 2nd cent. B. C.

Period IIB—A hoard of 3,268 punch-marked coins belonging to 2nd-1st centuries B. C. was found. Two ring-wells attached to a brick floor were also discovered.

Period III—The period is marked by the emergence of red polished ware and covers the period of the Satavahanas, the western Ksatrapas and the Guptas. The coins of the period include those of the Nagas, the Ksatrapas, of Ramagupta and the Indo-Sassanian coins. Several baked

clay moulds of the Ksatrapas, with the names of four kings were also unearthed. Two clay sealings also deserve notice. One of them bears the figure of *Gajalakṣmi* and the legend *Airikine Gomika visayadhikara(nasya)* written in Gupta Brahmi characters. *Airikina* stands for the old name of the town. The second sealing bears the inscription *Mahādandanāyaka Simhanandi.* The third sealing mentions Ksatrapa Simhasrisena, son of king Isvaramitra.

Period IV—It yielded abundance of polychrome glass and lac bangles, glazed ware sherds and coins of some native states.

Tripuri

The sequence of cultures brought to light by the excavations is as follows :

Period I—(c. 500 B.C. to 300 B.C.)
Period II—(c. 200 B.C. to 100 B.C.)
Period III—(c. 100 B.C. to 200 A. D.)
Period IV—(c. 200—400 A.D.)

Period I is marked by N. P. B., Black-and-Red, coarse red and white-slipped wares. No structural remains were noticed. A copper bull figure from the period is interesting. Period II yielded punch-marked coins, round cast coins with the Brahmi legend *Tipuri* of about 200 B. C. and inscribed Satavahana coins. These latter coins continued in Period III also. Some of them bear the legend *Raño Siri Satasa* written in bold Brahmi characters. A new king Sujethasena is known from one of the coins found in the layers of Period III. In Period IV pavements of large size burnt bricks were noticed. Several arrowheads and spear-heads made of iron and beads of glass and shell were also discovered. Among the significant finds of Period IV were six inscribed circular sealings of baked clay. Four of them mention the title *Vasisthiputra Maharaja* before the names of two rulers, Sivabodhi and Vasubodhi. These Bodhi kings ruled over the Tripuri region during the 2nd-3rd centuries A. D.

Explorations

So far the department has conducted explorations in fourteen districts of Madhya Pradesh, viz. Sagar, Vidisha, Raisen, Sehore, Mandsaur, Rewa, Satna, Panna, Jabalpur, Raigarh, Hoshangabad, Guna, Sheopuri and Gwalior. As a result, fresh material bearing on the political and religious history, and art and architecture of the region has been discovered. A detailed study of the central Indian Gupta sculpture and the Chedi and Gurjara-Pratihara art is in progress. The explorations have brought to light the fact that along with the development of the Saiva and Vaisṇava pantheons, the Śākta cult was also quite popular in major parts of Malwa and the Vindhya region during the early Medieval period.

—K. D. BAJPAI

VIKRAM UNIVERSITY, UJJAIN

Only three years ago our University opened a new branch for the Archaeological explorations and excavations so as to assist the research work in the field of indological studies. During this short time two major works were undertaken by the branch, one being the archaeological survey of ancient Ujjain and its adjacent area, the other being the small excavation of a chalcolithic site in Malwa.

The survey of Ujjain resulted in collection of images from different sites in ancient Ujjaini, ranging from the Mauryan to the Parmar period, i.e., dating back from 300 years before the Christian era to 12th and 13th century. Images of different sects of Hinduism, like Vishnu, Parwati, Uma Mahesh, Yogeshawar Vishnu, Ganesh, dancing figures, Ganga, Lakulish, Tirthankar and Yaksha are distributed throughout Ujjain. Some of them were given to the University by private collectors and enthusiasts like Padmashri Suryanarayan Vyas, Bhati, Bharati Kala Bhawan and others.

Most important of these is a figure of broken elephant which once formed the part of a Mauryan capital. The polish, which remains only at few places now, is a clear indication of its Mauryan association. This figure resembles the elephant of Sankisa. The colossalness of the figure as well as the use of Chunar stone also leads to the same conclusion. This was found at Sodhangha, an early historic site, few miles from Ujjain. This seems to be the only capital remain from Western Malwa dating to such an early peroid and associated with Asoka who ruled in Ujjain as a Governor (2nd century B.C.).

The collection was enriched by the donations of few fragmentary inscriptions. Bharati Kala Bhawan donated three inscriptions, one being of the Kshartapa period bearing the legend *Damasya raino'*. Coins of Rudradaman have often been found at Ujjain and this inscription may be that of Rudradaman. Kshatrapas ruled over Ujjain for a long time and this is the first inscription of that period ever found in Ujjain. This is a part of some railing, may be that of some stupa. The author found it in the ancient ruins of Ujjaini near Pratap Nagar. Next inscription is of the Parmar period referring to a great victory by some Parmar king Vijjasinha over some Muslim invader. It being fragmentary, no more information could be derived. The third is also a fragmentary inscription, palaeographically dating back to 8th century A.D. and referring to some battle. This was donated to Kala Bhawan by the Bhave family of Ujjain.

Following are the chalcolithic sites which were discovered while exploring Malwa within the last twenty years.

CHAMBAL VALLEY

1. Digthan.
2. Dhangawada.
3. Piplya.
4. Bhilsudi.
5. Tungani.
6. Takrawada.
7. Metwada.
8. Parmar Khedi.
9. Rajagad
10. Sanjeet.
11. Pasewa.
12. Monoti.
13. Jallod.
14. Patan.
15. Nepawali.

16. Mechakda.
17. Runija.
18. Unchakheri.
19. Thadovada.
20. Jaōra.
21. Sonagad.
22. Badawada.
23. Meen.
24. Khacharoda.
25. Nagada.
26. Rajota.
27. Dhangwada.

SHIVANA RETAM VALLEY

28. Mandsour.
29. Neemuch.
30. Baredi.

CHOTI KALISINDHA

31. Kanipura.
32. Futipul.
33. Kayatha.
34. Gangadhar.
35. Maksi.

PARWATI

36. Vidisha.
37. Betwa.

BETWA

38. Vidisha.
39. Eran.

GHAMBHIR

40. Singoda
41. Khedi.
42. Manawar.
43. Badwada.
44. Mohipura.
45. Pipalda.
46. Maheshwar.
47. Navda Toli.
48. Badada.
49. Badawada.
50. Mardana.

FEW OTHERS

51. Kithoda
52. Mahatpur.
53. Baloda.

—V. S. WAKANKAR

PURĀTATTVA

Bulletin of the Indian Archaeological Society

No. 3 1969-70

Editor

A. K. Narain

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The Indian Archaeological Society

Banaras Hindu University

VARANASI-5 (India)

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Status of Barley in Indian Archaeobotany with Remarks on the Aryan Hypothesis

by VISHNU-MITTRE

Wheat, barley, rice, millets and maize comprise the cereals so far discovered from the Indian archaeological sites [1]. In proportion wheat, rice and millets abound in several archaeological sites suggesting that these comprised the staple diet of the ancient Indians. Records of barley are not only scarce but are represented by few grains. *Hordeum vulgare* var. *nudum* is known from Mohenjo-Daro, and *H.* var. *hexastictum* from Harappa. Kalibangan is the only site where abundance of barley is noted in the material under examination. These three sites belong to the Harappan culture, the time spread for which is now determined between 2300 B.C.—1750 B.C. [2]. The Mohenjo-Daro charred grains are dated to 1650 B. C.[3] but the grains from other sites are not precisely dated. That the Harappan culture was not characterised by a staple diet comprising exclusively or predominantly of barley is quite clear except from Kalibangan. Further at Lothal only rice has so far been found.

Much after the decline of the Harappan culture, barley appears at Atranjikhera dated to about 1000 B.C. [4]. Its proportion at this site is not known to the author. Hitherto there is no record from the Chalcolithic period and the gap extends over 600 years.

Towards the beginning of the Christian Era barley is met with in small proportions at Ter, Osmanabad, Maharashtra [5]. Two dates 2045± 100 and 1645±100 are available from this site [6].

From the above records the discontinuity in the history of barley in India is apparent more particularly during the Chalcolithic i. e. 1600 B.C. to 1100 B.C., and equally apparent is the scarcity of records from the Harappan culture except from Kalibangan. Apart from that the evidence of barley exclusively as staple diet is almost lacking except at Kalibangan. Its emergence during the Iron Age and thereafter during the early Christian Era is interesting but in proportion it is poor. On the whole the present knowledge of the ancient plant economy as built up from archaeobotanical records is not suggestive of barley as staple diet (except at a single site : Kalibangan) at any time in our history [7]. What future discoveries may have in store in this connection is yet to be seen.

In the ancient written records [8] '*Yava*' (interpreted as barley by all scholars) is so frequently mentioned that it seems to be an important article of food and comprising staple diet. The *Rik Samhita* only refers to barley and no other cereal. In the later *Samhitas* both rice and barley are prominent though wheat is also mentioned but it seems secondary. During the period of the *Upanishads* and the *Sutras* rice and barley continue to comprise staple diet and wheat finds rare mention.

Thus the literary records do not seem to corroborate the information from the archaeobotanical finds. Unless the future records change the position of the history of barley in India, one may be inclined to believe that hitherto archaeobotanical researches have brought out the plant economy of the Pre-Aryans and of the tribes contemporary with Aryans. The significance of abundance of barley at Kalibangan is to be assessed in the light of other evidences. But the presence of wheat together with barley, the age of the site and its Harappan culture preclude the possibilities of any Aryan context.

From other grounds the Banas culture has been suggested as representing a later wave of the Aryans [9] but plant economy at Ahar, Rajasthan, comprising rice and *Sorghum*, is much different from the staple diet comprising barley or barley and rice as known from literature. The early wave of the Aryans also remains unrecognisable from archaeobotanical view-point. It is not clear if the small proportion of barley at some Harappan sites and in some Iron Age and later sites indicates indirectly the influence of the Aryan waves or barley was a constituent of the diet of pre-Aryan and later tribes. It is interesting to note in this connection that the plant economy of the Pre-Harappan cultures in Afghanistan [10] as known from Mundigak, Period II (2530 B.C.) comprised wheat only while at Deh Morasi Ghundai it comprised *Hordeum vulgare* var. *afghana* and *Aegilops tauschii*, a progenitor of wheat. This site about 60 km. northeast of Mundigak is dated to 3000 B. C. on comparative grounds.

Thus, considered purely from the archaeobotanical viewpoint, the researches hitherto done do not throw much light on the advent of Aryans in one or several waves. If barley is to be associated with them as our ancient literature suggests, then the evidence exists of the Aryan influence on indigenous cultures provided it is proven that barley was not at all a favourite cereal in ancient India prior to the arrival of the Aryans.

Notes

[1] Vishnu-Mittre, 'Protohistoric Records of Agriculture in Ancient India' *J. C. Bose Endowment Lecture* 1968, *Trans. Bose Res. Instt., Calcutta*, (in press).

[2] D. P. Agrawal, *Science*, 143, No. 3609, 1964, 950–952.

[3] *Radio-Carbon*, 1964, 231.

[4] Vishnu-Mittre, *op. cit.* [1]

[5] *Ibid.*

[6] Personal communication from Dr. Moreshwar G. Dikshit, Director of Archives and Archaeology, Maharashtra State.

[7] Vishnu-Mittre, *op cit.* [1].

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Copper Red Glasses Through The Ages

by H. C. BHARDWAJ

Introduction

In fourth millennium B. C. glaze was used by the Badarians in Old Egypt and by the Jamdet Nasr people in Mesopotamia. The main purpose of the earliest glazes and glasses was to make immitation of precious and semi-precious stones for beads, amulets and inlay in jewellery. Red colour had always occupied important position in man's choice. Accordingly red jasper (an impure, opaque and compact variety of silica, coloured by iron compounds), red coral (an impure calcium carbonate in the form of skeleton of various marine organisms) and carnelian (translucent red chalcedony) were particularly used in ancient civilizations of Egypt, Mesopotamia and India.

Among the earliest red glasses (copper-red) are the specimens of beads from Ur (British Museum No. 116582) datable to circa 1800 B. C. Mesopotamian Cuneiform text of circa 1700 B. C. also mentions Akkadian Santu (red) glass. A number of glass objects of red (haematinon) colour are known from XVIII Dynasty Egypt datable to circa 1400 B. C. Since this remote antiquity and upto modern times copper red glasses have been continuously made and used. Neuberg[1] states that during the course of centuries the process of making this glass was repeatedly forgotten to be discovered afresh.

Occurrence of red glass in ancient India

No true glass has been reported from the earliest Indian civilization, e. g. Harappan cultures (datable to 2350 B. C.), but faience (glazed siliceous ware) and glazed pottery has been reported from this civilization. Among the faience objects are the chocolate coloured material, in which cuprous oxide is the colouring agent. The chemical composition of this object is reported in Table II, Sr. No. 1.

True glass specimens of copper red glass are from later archaeological sites e. g. Rajghat (Varanasi), Kausambi, Ahichchhatra, Taxila. Nasik, Kaundinyapur, (Vidarbha), Vaisali, Tripuri, Nevasa, Maski, Arikamedu, Sulur, Nalanda, some sites from Assam and quite a few other locations[2].

Dates of Indian copper red glasses

Except the chocolate red faience material which is datable to 2350 B. C., (which may be the earliest example of use of cuprous oxide as a colouring agent in glaze), the other samples are quite late. The specimens from Rajghat, Kausambi, Ahichchhatra, Taxila, Nasik are datable between 600 B. C.—200 B. C. The others belong to early centuries of the Christian era. Some of these are from unstratified deposits and hence no definite dates can be assigned.

Physical nature of this glass

The glass samples are mostly opaque, having shades of lac, jasper, coral, vermillion, cherry, burnt sienna and rarely orange. The surface is neither very smooth nor very shining, it is rather dull. However, freshly broken surfaces are lustrous.

Nature of glass objects

Amongst the objects are the beads, ear reels, thin drawn strips of haematinum (Taxila),

reefs (coral like), and long unevenly cut canes (Arikamedu).

Weathering product of this glass

Excavation at Kaundinyapur (Vidarbha) has yeilded an ear re l of opaque vermilion red glass, the surface of which is covered with a mm. thick layer of green patination, a characteristic weathering product of copper. A few specimens of red glass have devitrified.

Chemical composition of ancient red glasses

Amongst the earliest example of red glazed material is from Mohenjodaro in the fo m of faience object, which is a semi glassy material, (Sr. No. 1, Table II). This is a glazed siliceous ware, the body consisting of powdered quartz, moulded into shape as a powder held together by lime and soda, heated until the lime and soda have fused to hold the silica particles. It must be pointed out that the faience is not glass and the material is paleochroic. The chemical composition of this object is given in Table II, Sr. No. 1 [3].

Mesopotamian glasses

The earliest true glass of red colour is reported from the excavations at Ur. The specimen is red glass bead and is now stored in British Museum (No. 116582). No chemical analysis of this or contemporary specimen is available. However the earliest reference to the making of red glass using copper is found in the Mesopotamian Cuneiform glass texts of Tell' Umar. These have been very meticulously translated by Campbell and Gadd with the assistance of glass technologists[4]. These texts are dated to the seventeenth century B. C. These run into 43 lines. At present these are lodged in British Museum (No. 120960).

Chemical composition suggested for red glass

Among the chemical constituents to be added for making the red glass called as Santu (red) glass and Akkadian Santu (red) glass are lead, copper, lime and salt petre in varying proportions. The proportions have been rendered into modern notation by Harden[5] (from the above mentioned 1700 B. C. Cuneiform glass texts) e. g.

Glass	230	parts
Lead	40	,,
Copper	58	,,
Salt Petre	3·10	,,
Lime	5.0	,,

It is difficult to work out the exact composition of the first item e. g. glass; may be it was a vitreous material made of silica, soda, small amounts of alumina and iron, calcium and magnesium oxides. A very approximate composition of this could be 65%silica, 25% alkalies and 10% others and if this proportion is applied to Harden's figures the raw material for copper red glass of 1700 B. C. may be approximately :

Sand	45.0%
Alkalies	17.5%
R_2O_3+CaO etc.	7.0%
Lead compound	11.0%
Copper ,,	17 0%
Salt petre	1.00%
Lime	1.50%
Total :	100%

Genesis of copper red glass

The earliest use of copper compounds in silicate material to impart shades of red is met with chocolate coloured faience from Mohenjodaro; Sr. No. 1, Table II. After this innovation copper compounds were used to make red glass. Though the earliest red glass object of Mesopotamian origin e. g. the specimens from the Ur excavations, datable to circa 1800 B.C. have not been analysed, yet

on the basis of the Cuneiform texts of 1700 B.C., we find the introduction of lead salt petre in red glasses, in addition to high and percentage of copper compounds for colouring red. From the chemical composition of glass of XVIII Dyansty Egypt from Tel el Amerna dated to 1400 B.C. (Sr. No. 1, Table 1); we find that the glass has low silica (51.85%), high alkalies (19%) and high percentage of Cu_20 (12.02%). Presence of 5.46% of $S0_3$ indicates the use of crude natron containing good percentage of Na_2S0_4. Later Egyptian glass of 2nd century B. C., (Sr. No. 2, Table 1) has much lower percentage of Cu_20 (2.5%). The presence of lead oxide (3%) and Mn0 (0.7%) are also notable.

Assyrian red glass of 8th-7th century B. C., (Sr. No. 4 Table 1) has high percentage of lead oxide (22.80%), Cu_2O (13.58%) and introduction of Sb_4O_6 (4. 07%), SnO_2 (0.32%) are noteworthy. The content of silica is low (39.50%). Broadly this glass has the composition of the Cuneiform tablet mentioned above. Roman Red glass, (Sr. No. 5, Table I) has the pattern of Egyptian glass of 2nd-1st century B. C. (Sr. No. 2, Table I); while glass from Pompii 1st cent. A. D., (Sr. No. 6, Table I) has broad resemblance with Assyrian glass. VIth century A. D. Byzantine glass has high percentage of SiO_2 (70.71%) low Cu_2O (1.26%). Small percentage of MnO is also present.

Chemical composition of Indian copper red glasses

Among the copper red glasses from Indian archaeological sites we find that specimens from Rajghat (Varanasi), Nalanda, Kausambi, Assam and Arikamedu e. g. Sr. Nos. 2, 5, 6, 7, and 8, Table II show complete absence of lead oxide. There is in general high content of iron e. g. Rajghat (9.67%) Nalanda (9.32+7.1)= 16.83%), Assam (9.16%). The amount of copper or cuprous oxide is also high e. g. Rajghat (Cu_2O—5.27 %), Assam Cu-9.13%), Kausambi, (Cu_2O-10.89), Nalanda specimen has comparatively very low copper content (Cu_2O-0.49%), Arikamedu specimen has also low content of copper (Cu_2O -1.33%). Presence of 5% P_2O_3 in Arikamedu specimen is also noteworthy.

Taxila glasses, Sr. Nos. 3 & 4, Table II on the other hand are a class in themselves, these have low SiO_2 e. g. 37.09% and 39.79% in Sr. Nos. 3 and 4 respectively. Both of these samples have a high percentage of lead oxide e. g. 34.85 and 38.93 in Sr. Nos. 3 and 4 respectively. These compositions look to be inspired by the Assyrian influence (cf. the Assyrian composition e. g. Sr. No. 4, Table I,) .

Typical features of ancient red glasses

As seen from the account above, the ancient copper red glasses were generally opaque, probably opaque red was perferred on account of their similarity to jasper and coral. These have in general high content of cuprous oxide. In some cases elemental copper is reported, but it is uncertain as no specific test is mentioned for the estimation of metallic copper. The presence of lead in high proportion in red glasses looks to be purposeful and needs investigation by the modern glass technologists.

Modern red glasses colouring mechanism

Opaque red glasses are not a modern desideratum, transparent brilliant red glasses are required. As we have seen above that use of copper compounds to produce red colour in glass is of remote antiquity, yet due to exacting conditions required for production of red colour by use of copper compounds, copper ruby glasses are often not commercialised and the knowledge of the production

TABLE I

Showing the Results of Chemical Analyses of Glass Objects from Old World

Sr. No.	Details of the object	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MnO %	Cu_2O %	PbO %	Sb_4O_6 %	CaO %	MgO %	Na_2O %	K_2O %	SO_3 %	SnO_2 %	Total
1	1400 B. C. Egyptian xviii Dynasty Tell-el Amarna Haematinon Opaque	51.35	0.90	0.75	—	12.02	—	—	8.40	2.54	17.22	1.86	5.46	—	100.50
2.	2nd-1st cent. B. C. Egypt red glass	59.1	3.6	1.6	0.7	2.5	3.00	—	9.8	3.1	10.3	6.4	0.5	—	100.60
3.	2nd-Ist cent. B. C. Elephantine Egypt. Haematinon opaque.	58.45	5.00	0.86	0.53	2.09	1.28	—	10.69	3.42	9.02	7.55	1.37	—	101.26
4.	8th-7th cent. B.C. Assyrian Sealing wax red glass	39.50		4.35	—	13.58	22.80	4.07	4.40	—	9.71	1.91	—	0.32	100.64
5.	2nd cent. A. D. Roman Haematinon red glass	59.28	5.99	1.89	1.32	2.83	0.61	—	8.45	1.36	16.18	1.53	0.37	—	99.78
6.	1st. cent A. D. Pompii Haematinon red glass	49.90	1.20	2.10	—	11.03	15.51	—	7.20	0.87	11.54	—	0.65	—	100.00
7.	6th cent. A. D. Byzantine red opaque glass.	70.71	3.42	3.26	0.55	1.26	0.24	—	7.26	1.05	11.55	0.70	—	—	100.00

Table II

Showing the Results of Chemical Analyses of Copper Red Glass and Faience Objects from Indian Archaeological Sites

Sr. No.	Details of the object	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	FeO %	MnO %	CuO %	Cu_2O %	Cu %	PbO %	NiO %	CaO %	MgO %	Na_2O %	KO %	P_2O_3 %	TiO_2 %	SO_3 %	SnO_2 %	Total
1.	Chocolate Faience Mohenjo-daro 2350 B. C.	91.07	2.44	—	—	tr.	—	1.98	—	—	—	1 28	tr	2.08		—	—	—	—	98.85
2.	Opaque red glass Rajghat 600-400 B. C.	65.01	2.28	9.67	—	—	—	5.27	—	—	0 15	4.08	0.49	13 05 by difference		—	—	—	—	100.00
3.	Opaque red glass, Taxila 300 B. C.	37 09	—	3.16	—	0.11		7 20	—	34.85	—	6.46	0.70	10.33	0.87	—	—	—	—	100 77
4.	Haematinum strip Taxila 300 B. C.	39.79	—	2.45	—	—	—	—	5.31	38 93	—	2.81	—	10.02	0.57	—	—	—	0.22	100.10
5.	Terra cotta red glass Kausambi 200 B. C.-200 A.D.	57.34	4.70	4.48		0.39	—	10 89	—	—	—	3.30	2.18	7.50	6 89	—	0.38	—	—	98.05
6.	Opaque red glass Nalanda	61.50	—	9.82	7.01	—	—	0.49	—	—	—	5.20	0.06	15.92 by difference		—	—	—	—	100.00
7.	Coral red glass Assam	53.25	6.12	9 16	—	—	—		9.13	—	—	9.18	1.47	11.69 by difference		—	—	—	—	100.00
8.	Red glass Arikamedu Early Cent. Christian era	64.81	1.20	3.41	—	—	0.72	1.33	—	—	—	4.81	2.35	11.35	4.32	5.00	0.31	0.10	0.39	100.10

of such glasses was very limited and the mechanism of the colour production was not fully understood.

Exhaustive studies in the formation of copper red glasses by Atma Ram and S.N. Prasad [6] have cleared the controversies in this regard and conclusively proved that red colour in copper red glass is due to absorption of light by the particles of cuprous oxide of colloidal size disperesed in glass; rather than to the presence of metallic aggregates. However, when glasses are struck at higher temperature, the Cu_20 is mostly decomposed to metallic copper and small amount of undecomposed Cu_20 is sufficient to impart red colour.

The amount of copper or copper oxide required for copper red glasses has also been controversial, in old literature use of 15% Cu_20 is advocated; later work has shown that small amount of 0.1—0.2% Cu_20 was quite adequate.

Opacity, streakiness and heterogenity of cu-red glass might have been due to the excess of copper content.

Use of Nitre

Fuwa[7] suggested that the use of nitre intensifies the colour of the copper red glasses, this observation is of interest because the recipe for red glass of 1700 B.C. mentions the use of salt petre as an essential ingredient for red glasses.

Use of Lead Oxide

It is of interest to find that many ancient Cu-red glasses have lead oxide as a major cons-tituent. The purpose of this addition might be to reduce the melting point of the glass and also to improve the quality of the colour of the glass.

Observation of Vargin and Kozhin [8] that partial replacement af lime by red lead improves the quality of red colour, needs attention.

From the above account it can be said that glass technology of 1700 B.C. and even earlier had made significant contribution to the evolution of copper red glasses.

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Laboratory Studies in the Jokha Midden Soil Samples

by KARUNAKARA T. M. HEGDE

Jokha (20° 20′ N. 73° E.) is a small village in Kamrej Taluka of Surat District in Gujarat State. An archaeological mound here with the remnants of the Chalcolithic culture was first discovered by Professor R. N. Mehta in 1957 [1]. The mound is low, rising only two metres above the surrounding black cotton soil fields (Pl. IA).

In the field season of 1966-67 the mound was excavated by the Department of Archaeology and Ancient History of the M. S. University of Baroda. The excavation revealed six almost horizontal layers. In trench I, which can be taken as the representative of the other four, *mutatis mutandis*, the top two layers showed mixed materials belonging to the medieval and the early historic periods. This mixing was a result of deep ploughing of the surface of the mound with tractors. The four layers below were undisturbed. The layer 3 showed materials of the early historic period. The layers 4 and 5 revealed relics of the Chalcolithic period. The layer six was free from antiquities. The upper layers, one to four, were ashy and grey in colour. The layer 5 was fissured, clayey, compact and black. The layer 6 was silty sand, yellowish in colour.

Stratigraphy of Trench I at Jokha

Layer	Colour of the air dry samples according to the Munsell colour notation.	Period
1 & 2	2.5 y. 5/2	Medieval and Early Historic
3	2.5 y. 5/2	Early Historic
4	2.5 y. 5/4	Chalcolithic
5	2.5 y. 4/2	Chalcolithic ?
6	2.5 y. 6/4	Free from antiquities.

The Chalcolithic community at Jokha was essentially a microlithic one. But it supplemented its needs in implements with polished stone tools like chisels and celts and copper artifacts. The pottery predominantly consisted of plain and painted red ware and buff ware. On the basis of this pottery and the polished stone implements the Chalcolithic community is dated to *c.* 1500 B. C. [2].

From the outset, in this excavation, it was thought desirable to seek solutions to the five questions which the excavation raised. The questions were :

(1) What was the exact nature of association of the Chalcolithic culture with the black cotton soil ? (2) What environmental resources attracted the Chalcolithic community to settle down at Jokha ? (3) What was the source of potable water of the community ? (4) Why did the Chalcolithic community desert Jokha after being there probably for a considerable period of time ? (5) What was the relative density in occupation of the mound in the early historic period and the Chalcolithic period ?

During the excavation at Jokha, bulk of the Chalcolithic relics were recovered from the layer 4. But a part of this material was also recovered from the layer 5, which was, as noted above, fissured, clayey, compact and black. Almost all over western India, cental India and the Deccan, the Chalcolithic culture is intimately associated with the black cotton soil.

Writing editorially on the Chalcolithic culture in *Ancient India*, No. 12, Ghosh commented, *inter alia*, "Another feature of the culture is its general association with the black cotton soil. Except at Brahmagiri, where

the soil is not encountered for the simple reason that the place is situated out side the zone of the soil and at Prakash, which is well within its zone but where the reason for its absence in the excavated area can only be a matter of speculation; the soil is present at all the centres. At Nasik, Jorwe, Tripuri, Bahal and Nevasa the respective excavators are definite that the relics of the culture were embedded well within the soil, at other places they are not certain about the intermingling of the geological and the archaeological deposits. The question requires further examination", [3].

Since this comment, made a decade ago, a host of other Chalcolithic sites in association with the black cotton soil have been brought to light [4]. Therefore, an investigation to elucidate the reasons for intermingling of the archaeological and the geological deposits has been a desideratum. The excavation at Jokha gave us the opportunity.

In this connection, the following two questions are pertinent. (1) Whether the black soil at Jokha was fully mature when the earliest Chalcolithic community settled over the site ? (2) If the soil was mature, how did the intermingling of the Chalcolithic relics with the soil take place ?

Soil maturity is usually determined by a chemical analysis of the samples obtained from different horizons in a soil profile and establishing quantitatively eluviation and illuviation in certain soil constituents like iron, manganese, calcium, phosphate, humus and acidity in them. But such a study in samples collected from different horizons of the black compact layer 5 of the Jokha mound, would not be of much significance, as the chemical constituents of the layer could be expected to be modified by human habitation.

Therefore, mechanical analysis of the samples to establish grain-size distribution in them was carried out. Samples for this study were selected from positions close to the top of layer 5, free from the ashy seepage of the layer 4, but relatively rich in the Chalcolithic relics and also from the A_2–A_3 horizon of the undisturbed black cotton soil in Jokha from an area away from the mound and at present not subjected to agriculture. Samples of the midden soil for this and other analytical studies, discussed below, were obtained from the North and the East walls of Trench I, in the form of a column, approximately twenty centimetres apart as shown in Pl. II Representative results obtained by mechanical analysis through hydrometer method are given below (see also Fig. 1).

Grain-size distribution in the samples

Description of the sample.	Clay fraction %	Silt fraction %	Sand fraction %
Top of the layers 5 Trench I, East Wall depth 145 cms.	9.7	80.2	10.1
Top of the layer 5, Trench I, North wall, depth 144 cms.	9.8	80.2	10.0
A_2–A_3 horizon of the undisturbed black cotton soil near Jokha	10.5	79.4	10.1

The above table of results does not indicate appreciable difference between each sample.

Nevertheless, it is interesting to note the percentage of clay fraction in them as it is one of the indicators of the degree in weathering to form soil. The difference in the clay fraction in the black compact layer 5 of the mound and the undisturbed black cotton soil is very small which varies from 0.8 % to 0.7%. From this observation it is possible to indicate that the black soil at Jokha was almost as much mature as it is today, when the earliest Chalcolithic community settled over the site. How then, did the Chalcolithic relics intermingle with the black soil ?

The black soil at Jokha is an excellent loam, rich in clay and humus. A quantitative estimation of the alkali soluble humus fraction in the undisturbed soil samples and the samples from the layer 5 of the mound indicated 2.42% and 2.28% respectively. This fraction is roughly one third of the entire humus complex present in the soil.

A clayey deposit without humus expands when wet and shrinks when dry, giving rise to extreme sticky consistency in the monsoon season and wide fissures in the summer season. When a clayey deposit is a soil rich in humus,

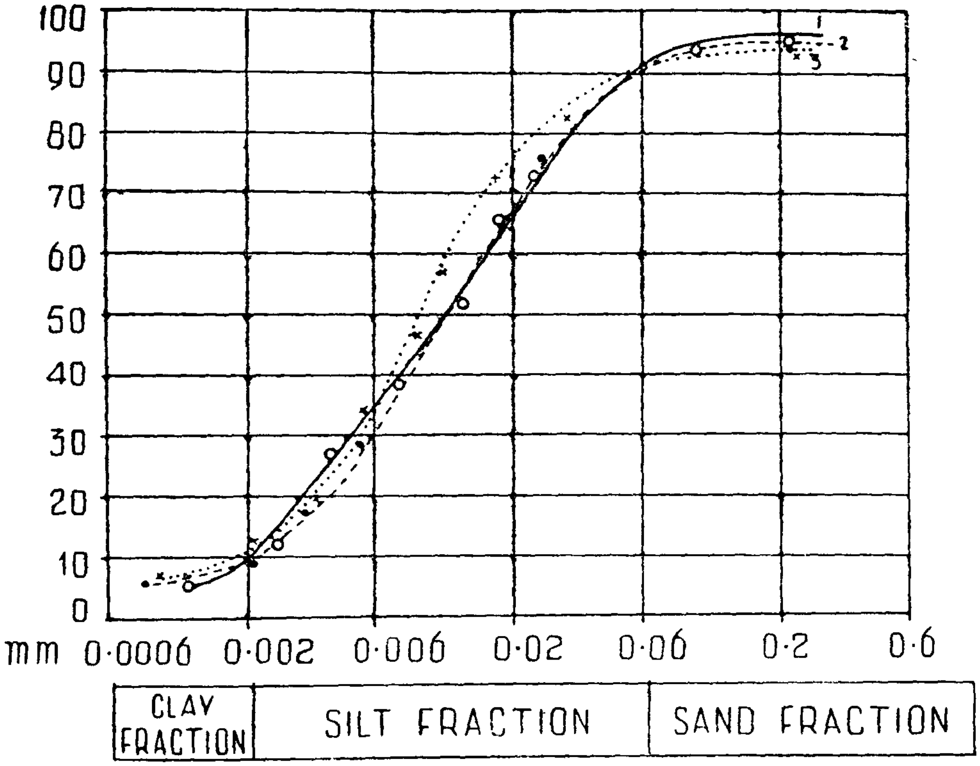


Fig. 1. Cumulative curves showing the grainsize distribution in the black soil within the archaeological mound and out side at Jokha. Curve 1 represents sample from top of L. 5, Tr. I, east wall at 145 cms. depth. Curve 2 represents sample from top of L. 5, Tr. I, north wall at 144 cms. depth. Curve 3 represents the sample from A_2—A_3 horizon of undisturbed black cotton soil at Jokha.

such alternate expansion and contraction processes in it become pronounced as humus itself swells when wet and shrinks when dry.

The combined effect of clay and humus in black cotton soil at Jokha is observed as frequent fissures in the soil in the summer season. Some of the fissures observed in the month of March, 1967 were more then 10 cms wide and a metre deep (Pl. IB.).

This annual fissuring in the black soil made it possible for the Chalcolithic relics penetrate deep into its interstices. The intermingling of the Chalcolithic relics and the black soil, therefore, is not due to contemporaneity in the formation of the soil and the habitation of the Chalcolithic community over it. On the other hand, the black soil at Jokha was almost as well formed as it is today, before the Chalcolithic settlement took place at the site. An extension of this study to the other Chalcolithic sites associated with the black cotton soil, may further support this observation.

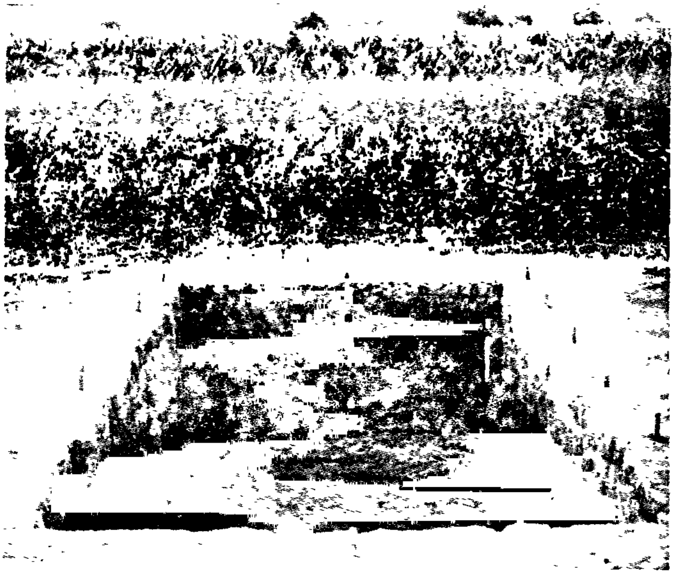
The second and the third questions which the excavation raised, (1) why did the Chalcolithic community select this site to settle down and (2) what was the source of their potable water—are also equally intresting. Jokha is situated at least six kilometres away, as the crow flies, from the nearest perennial source of water, the river Tapi. There are no springs in or around Jokha. What then attracted the Chalcolithic community to this site ?

The black cotton soil at Jokha is over a metre thick. It is underlain by yellow silty sand. This silty sand deposit was formed during one of the river aggradation phases, probably in the late Pleistocene period. The thick black soil that caps the silty deposit is a result of weathering *in situ* of the former.

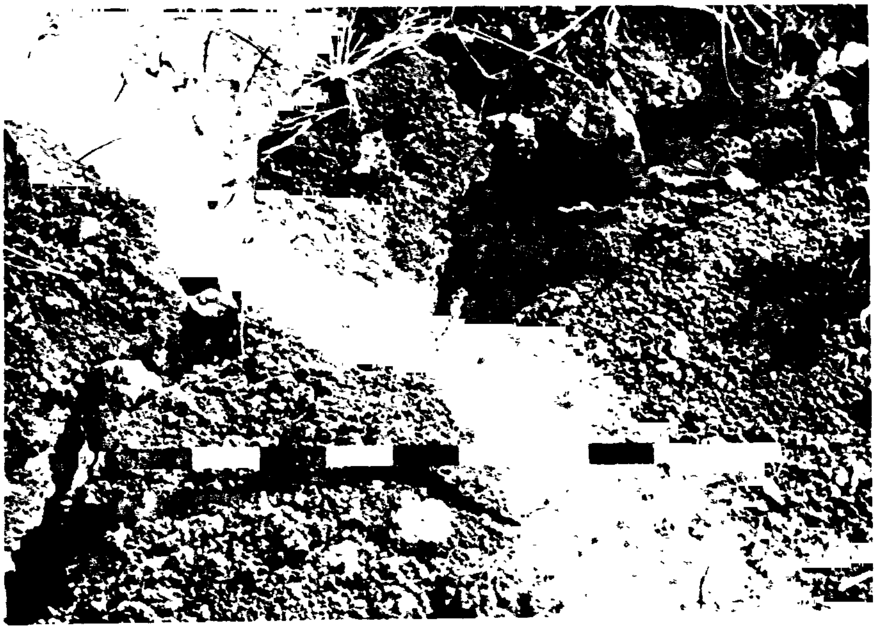
As noted above this is a loamy soil rich in clay and humus. It has low permiability and its moisture content is not prone to rapid evaporation. These qualities of the soil promote retention of moisture within the root zones of the cereal plants. In the course of the excavation at Jokha, saddle querns, well worn with deep circular depressions in the centre and pottery sherds with rice husk impressions were recovered from the Chalcolithic levels, indicating thereby that agriculture was one of the occupations of the Chalcolithic community.

On this soil, even scanty rain of 350 mms., if it is evenly distributed in the agricultural season, is capable of germinating the rice seeds and bringing them to satisfactory harvest. The mean annual rain fall during the last 20 years in Surat and its surrounding areas within a radius of 20 miles, which includes Jokha, has been 1058.4 mms. [5]. Therefore, it is possible to observe that the soil at Jokha held promise of rich agricultural harvest even during the Chalcolithic period. Studies in the animal bone remains recovered during the excavation from the Chalcolithic levels at Jokha indicate that hunting was one of the important occupations of the Chalcolithic people and the area held out promise of an abundance of game. Hunting and agriculture probably attracted the first Chalcolithic community to Jokha, situated on a wide fertile valley floor of black loamy soil. The first community may have settled on a natural eminance. What was their source of potable water ?

Though the land around Jokha looks like a flat rolling plain, a closer observation of the land surface reveals minor undulations in the topography. This has given rise to natural niches, where local accumulation of monsoon



A. General view of the Jokha mound under cotton crop. Trench I in the foreground. Note the banana plantation in the background.



B. Jokha : Deep, wide annual fissures in the black cotton soil, photographed in March, 1967.

Jokha : A column of samples collected from the North Wall, Trench I.

runoff produces a pond. Such shallow ponds were probably the source of potable water for the Chalcolithic community. Five such shallow ponds, each containing several million litres of water were observed around the mound at Jokha in the month of March, 1967. There may have been many more during the Chalcolithic period as the land use under agriculture was limited.

Proximity of potable water and potentialities of agriculture and game notwithstanding, the Chalcolithic community at Jokha appears to have deserted the site after living there for a period of time. The excavation revealed that the occupation of the mound from the Chalcolithic to the early historic period was not continuous. Though, stratigraphically there was no discernible gap between the occurrence of the material remains of the two periods, the Chalcolithic potteries recovered from the upper horizons of the layer 4 were found to be weathered, rounded and their surface finish heavily deteriorated, indicating thereby that the material remains of the later Chalcolithic community were not immediately embedded, but exposed to the elements for some time owing to desertion of the site. What impelled the Chalcolithic community to move from Jokha ?

The excavation did not reveal any evidence either of fire or violence. There may have been an epidemic for which there was no evidence either. To help us find a plausible answer to this question, we obtained the meteorological data for Surat and its surroundings for the last 20 years from the Meteorological Department of the Government of India.

The mean rainfall during the last 20 years in this area has been 1058.4 mms. But the minimum rainfall within this period in 1948 was as low as 474.5 mms. Though the mean number of annual rainy days in the area in the last 20 years was 47.6, the low precipitation of 1948 was restricted to only 27 days. Further, closely following 1948, in consecutive three years of 1950, 1951 and 1952, the rain fall as well as the number of annual rainy days remained much below the respective mean values as given below :

Year	Rainfall in mms.	The number of annual rainy days
1948	474.5	27
1949	1147.3	50
1950	729.7	47
1951	605.5	34
1952	638.8	38
1953	1713·7	50

From the above table, it is possible to observe that such persistence in low precipitation lasting over three consecutive years would lead to draining away of the shallow ponds, which as indicated above, probably, served as sources of potable water to the Chalcolithic community. For want of water, the Chalcolithic community had no other alternative but to desert Jokha.

Today, however, a situation leading to desertion of Jokha for want of water is almost inconceivable. The entire area, including the archaeological mound is now subjected to intensive agriculture with round the year irrigation facility, drawn from the Tapi river, impounded nearly 90 kilometers upstream at Ukai. One of the irrigation canals known as the Katargam distributory main line, flows close to the mound on its northern side. This irrigation facility has vastly transformed the agricultural potential of the area, made the

farmers already prosperous and secure within their homes.

But this intensive agricultural activity has also obliterated any subtle evidence that may have been there, within the mound, which may have enabled us to seek solution to the fifth question the excavation raised, namely, what was the relative density in occupation of the mound in the early historic period and the Chalcolithic period ? Quantitative estimation of phosphate and humus in samples collected from the layers 3 and 4 showed incomparable results. This was due to the use of both organic and phosphate manures on the mound and their penetration to the layer 3 through deep ploughing of the surface of the mound.

Acknowledgements :

Author's grateful thanks are due to : (1) The Director, Regional Meteorological Centre, Bombay-5 and (2) Professor R. N. Mehta, Head, Department of Archaeology and Ancient History, M. S. University of Baroda for encouragement.

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The Metal Technology of the Indian Protohistoric Cultures: Its Archaeological Implications*

by D. P. AGRAWAL

1. Introduction

In trying to reconstruct a past, which is essentially pre-literate, the immense role of technological studies cannot be over-emphasised. At times, even the shapes of corroded objects cannot be identified without using special techniques such as X—ray radiography [1].

In India, the period beyond ca. 400 B. C. is devoid of any decipherable records. Recent excavations, however, have provided ample evidence about the material traits of these protohistoric cultures. These artifacts or material traits when studied typologically do give important clues. But quite often morphological similarity may be deceptive; hence typological studies have to be supplemented by additional data on the technology employed. Below, we will discuss the salient features of the copper-bronze technology of the Pre-Harappa, the Harappa, the Copper-Hoards and the other Chalcolithic cultures†, and draw archaeological inferences from these data. In our discussions we will also take into account the ecologies in which these cultures thrived.

2. Technology

Metal technology mainly involves ore-extraction, alloying of the metal and metal-forging techniques. The distinctive techniques used can give us points of affinity as also differences amongst cultures, besides indicating the mines used.

We will discuss these processes under three categories : (i) Metal Forging Techniques; (ii) Alloying; and (iii) Ores used.

2. (i) Metal Forging Techniques

To determine the state of metal technology of a particular culture, the metal forging techniques used are a good index. We used metallographic examination as also surface examination of the artifacts for determining the original techniques employed. We will not expatiate on the techniques [2] here but give the results only.

The pre-Harappans were very poor in metal. The available evidence indicates that copper was being used on a small scale either because of lack of known local ores or due to the inability of the Pre-Harappan societies to afford full-time metallurgists.

The Harappans, on the other hand, show a sudden upsurge in metallurgical activity. They have a profusion and veriety of pots and pans indicating the knowledge of the techniques of 'sinking', 'raising', 'running on' etc. But no metal vessels are reported either from the Chalcolithic cultures, or the Copper Hoards. The Harappan and the Chalcolithic metal artifacts betray the knowledge of cold

* This paper summarises the results of an extensive study of the protohistoric metal technology undertaken by the author [2].

† 'Chalcolithic cultures', in this article, includes mainly the Banas, the Malwa, and the Jorwe cultures.

working and annealing; but these techniques, surprisingly, were not probably known to the Copper Hoards people. Quite developed casting methods, including *cire-perdue*, were used by the Harappans. The Chalcolithic people seem to have used only open moulds. But the Copper Hoards show the use of close casting as indicated by the harpoons and the tell-tale ridges on some Gungeria axes. In metal forging technology the Harappans are most advanced, then come the Copper Hoards, and lastly the other Chalcolithic cultures.

In total metal inventory and abundance of metal, the Harappans lead the rest, followed by the Copper Hoards. The chalcolithic cultures are poorer in this comparison too; though far richer than the neolithic cultures of the south.

2. (ii) Alloying*

In west Asia, where metallurgy was mastered earlier than in India, occurrence of tin and nickel alloying was noticed in the I Dynasty grave goods at Ur [3] and from the Early Dynastic times [4] in northern Mesopotamia.

For pre-Harappa cultures the data are meagre. From Mundigak a low-tin (1.06%) bronze is reported [5]. The available analyses from Nal [6] indicate lead alloying only.

In the Harappan artifacts tin percentage greatly varies :

No. of Tools :	7%	10%	14%	6%
Tin Content :	1%	8%	8-12%	12%

These percentages are based on about 200 chemical analyses. Detailed tables and discussions have been published elsewhere.

From the data above it is clear that 70% of the Harappan tools were not alloyed and only 14% were alloyed in the optimum range of 8-12% tin. The variations indicate that though the advantages of alloying were understood, yet correct proportions could not be controlled.

Tin bronze is more abundant (23% tools) in the upper levels of Mohenjodaro than in the lower levels (6%). Tin bronze was mainly used for making knives, axes and chisels. But the fact, that 70% tools were of pure copper only, indicates scarcity of tin.

In the Harappan artifacts arsenic alloying is also infrequent (8% tools); 4% tools only show nickel alloying and 6% artifacts lead alloying. It is likely that arsenic may have been used only as a deoxidiser for closed castings.

The Chalcolithic cultures have no artifacts alloyed with arsenic. Lead is common though and varies from 1–2%; it was probably a deliberate addition for better fusibility. As regards tin, a Jorwe axe has 1.78%; a Nevasa chisel has 2.7%; and the three Navdatoli specimens have it within 3–5%. It is obvious that tin alloying was known to these people, though it was not used in the optimum range of 8–12%. Tin, however, is significant by its absence in the Ahar artifacts.

* Pure copper is quite soft (89 Brinell Hardness) and very difficult to cast in closed moulds. It has atendency to 'gas' when cast, producing a porous casting. Addition of tin or arsenic considerably reduces this tendency as they function as deoxidising agents. Upto 16% tin and 4% arsenic form solid solutions with copper. Solid solutions have a greater hardness than any of the individual elements they are composed of, yet have sufficient ductility to be worked both hot and cold. If cold worked, the hardness is greater. For best results, the optimum range is 8-10% of tin. More than 1% of impurity in copper is considered as deliberate alloying.

Thus, we see that the high range of tin, lead and arsenic alloying of the Harappan artifacts stands apart from that of the Chalcolithic objects.

The evidence of alloying in the Copper Hoards is rather controversial. Smith [7] had mentioned four bronze samples from the Copper Hoards. This evidence is not so reliable, as most of these tools were taken from British museums and their exact provenance was not known.

Lal [8], however, found that the Bisauli anthropomorph contained 98.77% copper and 0.66% of nickel, and was thus unalloyed. The five Copper Hoard specimens* analysed by us too indicated absence of tin alloying. Thus the present evidence favours Lal's view that the Copper Hoards' people did not use alloying.

On the basis of the aforementioned evidence, we can thus tentatively infer that : (a) the Harappans were using deliberate arsenic, lead and tin alloying; (b) the Banasians were adding lead only; (c) the Malwa and Jorwe cultures were using lead and tin alloying only; and (d) the Copper Hoards were probably fabricated out of pure copper only.

2. **(iii) Ore-correlations**

The problems of ore- correlations are quite complicated. Desch [9] thought that nickel was the key element for identifying the mines exploited, which led him to the incredible origins of Transvaal mines for early copper in West Asia. Sanahullah [10] considered both nickel and arsenic as important for identification of the mines used. We will not go here into the inadequacies of these simplified approaches. For ore-correlations we have used comparison of the impurity patterns of the ore and the artifact, following Pittioni [11, 12], for determining the types of ores used we have calculated the probabilities on the basis of the statistical approach† given by Friedman et. al. [13]. It should be noted, however, that at the moment the data are not sufficient to warrant absolute conclusions; only tentative inferences can be drawn at this stage.

At Harappa and early levels of Mohenjodaro, the probability of the use of native or oxide ores is very high. Though on the whole, native or oxide ores were commonly used, yet use of sulphide ores on a limited scale is indicated right from the early levels. Use of oxide ore is further supported by the discovery of large quantities of such ore from a brick-lined pit in Room 51, D. K. area at Mohenjodaro [14]. Native copper and oxide minerals occur on the surface outcrops of ore bodies. The preponderance of the use of native and oxide minerals thus may indicate use of fresh mines.

The limited number of available analyses [15] of the Chalcolithic artifacts do not indicate any probability of the use of sulphide ores.

The analytical data for the artifacts of other cultures is too meagre to infer anything.

Tables 1 and 2 give the comparison of impurity patterns of the ores and the artifacts belonging to the Chalcolithic and the Harappa cultures respectively. It is important to note that Singhbhum pyrites showed absence of arsenic, antimony and lead, which are present in significant amounts in the Harappan artifacts.

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* The specimens were : Shahabad celt; Shahabad harpoon (?), Kamdera celt; Dhanbad celt and Dargoma celt.

† The details of technical data and the approach used have been given in a comprehensive book [2].

Table 1

Key : + = present
nd = not detected
ns = not seen

Spectroscopic Analyses*

Chalcolithic Sites

Sample Description	Ag	Fe	As	Sb	Pb	Bi	Cu	Sn	Ni	Zn	Mn	Co	Au	Al	Cr	Mo	Zr	W	Ti	Mg	V	Gd	P	Si
1. Navdatoli Axe	+	+	+	nd	+	+	+	+	+	+	+	+	nd	+	+	+	+	nd	+	nd	+	+	nd	nd
2. Navdatoli Chisel	nd	+	+	nd	+	+	+	+	+	+	+	+	nd	+	+	+	+	nd	+	nd	+	+	nd	nd
3. Chandoli Axe	nd	+	+	nd	+	+	+	nd	+	+	+	+	nd	+	+	+	+	+	+	+	+	+	nd	nd
4. Somnath Axe	nd	+	+	nd	+	+	+	+	+	+	+	+	nd	+	+	+	+	+	+	nd	nd	+	nd	nd
5. Ahar Axe	nd	+	+	+	+	+	+	nd	+	+	+	+	nd	+	+	+	+	nd	+	+	nd	+	+	+
6. Ahar Metal Sheet	nd	+	+	+	+	+	+	nd	+	+	+	+	nd	+	+	+	+	nd	+	+	nd	+	+	+
7. Khetri Ore	nd	+	+	+	+	+	+	nd	+	+	+	+	nd	+	+	+	+	+	+	+	+	+	+	+
8. Nevasa Chisel 6721	+	+	+	ns	+	+	+	+	+	+	+	ns	ns	+	ns	ns	ns	ns	ns	+	ns	ns	ns	+
9. Nevasa Bangle 6722	+	+	ns	ns	+	+	+	+	+	+	+	ns	ns	+	ns	ns	ns	ns	ns	+	ns	ns	ns	+
10. Nevasa Bead 6723	ns	+	ns	ns	+	ns	+	+	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns

* Nos. 1 to 7 based on [16] and 8 to 10 on [17].

Table 2

Spectrosoopic Analyses*

Key : × = present
nd = not detected
ns = not seen

Indian Ores and Artifacts

Sample Description	Ag	Fe	As	Sb	Pb	Bi	Cu	Sn	Ni	Zn	Mn	Co	Au	Al	Cr	Mo	Zr	W	Ti	Mg	V	Gd	P	Si
TF-Cu-14a Madras Pyrrhotite	nd	×	nd	nd	nd	nd	×	nd	×	×	nd	×	ns	nd	nd	nd	nd	×	nd	nd	nd	ns	ns	nd
TF-Cu-14b Madras Pyrrhotite	nd	×	nd	nd	nd	nd	×	nd	×	×	nd	×	ns	nd	nd	nd	nd	×	nd	nd	nd	ns	ns	nd
TF-Cu-5 Mohenjodaro Galena Ore	nd	nd	nd	×	×	nd	nd	nd	nd	nd	nd	nd	ns	nd	nd	nd	nd	nd	nd	nd	nd	ns	ns	nd
TF-Cu-15 Singbhum Chalcopyrite	nd	×	nd	nd	nd	nd	×	nd	×	×	×	×	nd	×	nd	×	ns	ns	×	×	×	ns	ns	×
TF-Cu-24 Khetri Chalcopyrite	×	×	×	×	×	×	×	×	×	×	×	×	nd	×	×	×	ns	ns	×	×	×	ns	ns	×
TF-Cu-3 Chanhudaro celt	×	×	×	×	×	×	×	×	×	×	×	×	nd	×	×	×	ns	ns	×	×	×	ns	ns	ns
TF-Cu-6 Mohenjodaro spearhead	×	×	×	×	×	×	×	×	×	×	×	×	nd	×	×	×	ns	ns	×	×	×	ns	ns	ns

* My samples.

A closer comparison of the impurity patterns of the spectroscopic analyses (Table 2) of the Harappan artifacts and various ores shows that there is a close correspondence only with the Khetri ores. Singhbhum chalcopyrites and Madras pyrrhotite are quite dissimilar. The available evidence thus indicates that the Khetri belt is more probable a mining area for the the Harappans. This source alone can justify the Mesopotamian imports of copper from Meluhha [18] . A comparison of the spectroscopic impurity patterns of the Chalcolithic artifacts with the Khetri ore also shows a good correspondence (Table 1). At present, with the limited analyses available, we can only say that Rajasthan copper ores were probably used by both the Harappans and the Chalcolithic people. Geographical vicinity also supports such an origin.

3. Archaeological Implications

Let us first consider the typological evidence. The Harappans have very distinctive types : the razors; the arrowhead; the barbed fish hook and the curved blades. They even had the first true saw and the first tubular drills which show their ingenuity. The Copper Hoards are distinguished by the anthropomorph, the antennae sword and the harpoon—so well adapted for a hunting-nomadic life. The Harpoon was probably used for hunting big game [8] as also big fish. The antennae sword with its unwieldy (4" —5") antennae could never be used as a sword. The antennae could only be useful if they were used by fixing them, pointing upwards, on logs of wood in pits, and then big game could be driven into them. The anthropomorph with its heavy head and externally sharpened arms is obviously a missile. These points have been elaborated elsewhere [19]. The Chalcolithic cultures, however, have very simple types which are ubiquitous. The typology shows that at least the Harappa and the Copper Hoard cultures are distinct groups without any demonstrable affinities. The so-called 'links' have been shown [15] to be technologically much different than their alleged counterparts in these cultures. For example, in the Chandoli dagger the tang-end has been chisel-split and beaten back over the wooden (?) handle to prevent it from slipping and is technologically different from the 4" —5" long antennae of the Copper Hoards, which were cast as such. So also the Copper Hoards' anthropomorphs have invariably a distinct thickening on the head, whereas the so-called Lothal anthropomorph fragment is completely flat in section.

The Harappans came to an end around ca. 2000 B. C. at the metropolitan centres. The Chalcolithic cultures thrived from ca. 2000-1100 B. C. Therefore there is only a probability of the Banasians coming in contact with the Harappans. But the factors that go against any direct transmission of traditions and industries are many : (i) the part-contemporaneity of the Harappans north of the Aravallis and of the Chalcolithic cultures south of them; (ii) early pockets of apparently indigenous and unique cultures, e. g., the Kayatha Culture; (iii) largely independent areal distributions of the Harappans, the Chalcolithic cultures and the Copper Hoards and their temporal succession; (iv) in fact these cultures thrived in completely different types of ecologies; and (v) their significant differences in metal technology. The Copper Hoards most probably are post ca. 1200 B. C. and their technology also does not suggest [19] any interaction with the Harappans or the other Chalcolithic cultures.

Let us discuss further the ecologies, in which these cultures flourished.

The spatial extent of the Harappa culture coincides with a uniform ecological zone comprising semi-arid land, watered by perennial rivers, which provided vast tracts of fertile alluvium. The earliest civilisations of Mesopotamia and Egypt too had flourished in similar ecologies.

The Doab, on the other hand, was a completely different ecology. It was an area thickly wooded with monsoon fed forest and had kankry soil. These forest barriers effectively isolated the Copper Hoard culture from the western areas. This culture probably originated in the Chota Nagpur plateau which was rich in copper minerals and also in forests for fuel. The Copper Hoard's tool kit, especially the harpoon, the so-called anthropomorph and the antennae sword, is so well suited for a hunting-nomadic life. The forested Doab provided plenty of game and the river-fish. The Copper Hoard culture flourished in this distinct ecological zone and probably later in time than even the Chalcolithic cultures. Their metal-technology as also typology of the tools shows complete isolation from the Harappans or the Chalcolithic cultures. If (at all) the Copper Hoards are not completely indigenous, they could only have a south-east Asian inspiration [19]. The prehistoric spread of Mon-khmer dialects from south-east Asia to east India [20] and the suggested identification of 'Mundas' (linguistically affiliated with the Monkhmer) with the Copper Hoards [8]; the known neolithic contacts of east India with south-east Asia [21, 22] and now the Copper-Bronze age of Thailand going back to ca. 2300 B. C. [23]—all seem to make such an eastern inspiration probable, though conjectural at this stage [19].

The Chalcolithic cultures were confined mostly to the narrow alluvial strips, as they could not colonise the sticky black-cotton soil with their meagre copper tools. Thus the ecology severely limited their agriculture production; consequently, without the agricultural surplus, they could not come out of their village-status.

Thus we see that these main protohistoric cultures—the Harappa, the Chalcolithic and the Copper Hoards—thrived in different milieus, geographically separated, and largely at different times. Despite the evidence (e.g. the Black-and-Red Ware; the devolution of the Saurashtra Harappa culture) of some traditions having passed from the Harappan to the Chalcolithic cultures, the pre-ponderent evidence of time, space, ecology and metal-technology is against any direct cultural transmission. The present evidence thus indicates that essentially these three cultures were independent cultural phenomena.

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A New Type of Neolithic Burial in Terdal, Mysore State

by A. SUNDARA

Background

Terdal, a big village of some historical importance in Taluk Jamkhandi, Dt. Bijapur, Mysore State, is on the Jamkhandi—Kudchi (a railway station on the Bangalore-Poona line of the South-Central Railway) road. Here is a Jaina temple [1] of some architectural interest with a dated (Saka 1044) inscription [2].

The village is situated at the foot of an extensive complex range of sandstone hills of the Kaladgi series covering a vast area on the east, south and southwest of the locality. In west and north, it is a plain land of the Deccan trap with very fertile black cotton soil. Thus, one, travelling from Kudchi to Jamkhandi, finds a sudden striking change of topography of the land from this locality onwards—from the plains of the black cotton soil to red hilly terrain. The hills are thinly wooded. About 3 km. north of the locality is the river Krishna flowing eastwards.

In 1944-45, A. M. Annigeri discovered some megalithic sites [3] in this and the nearby localities viz. Halingali, Hanagandi, Madalmatti and Asangi.

In 1964, in connection with my research on megaliths in north Karnataka, I explored these sites for studying the megaliths there. Incidentally, I also examined an ancient site locally called 'Vibhūtimaddi' in Terdal, mentioned in the *Gazetteer of the Bombay Presidency*, Vol. XXIV, Kolhapur, 1886, (p. 373) and found it to be a neolithic site. Subsequently I noticed three more neolithic sites [4] in this locality and about 21 sites in about 11 localities [5] west of Terdal and 13 in 11 localities [6] on the east, all in the valley of the river Krishna.

These sites yielded invariably highly lime encrusted animal bones, parallel sided blades, fluted cores occasionally with crested guiding ridge and microliths such as backed blades, crescentically retouched blades, single retouched points, crescents made on chert and chalcedony, thus technologically and typologically comparable to those of the chalcolithic Chandoli [7], Nevasa [8] etc., occasionally neoliths, especially axe of the pointed butt end type, and neolithic grey ware pottery of Maski fabric, in large quantities.

In many of the sites, particularly those west of Terdal, it is noteworthy that black-on-red painted pottery of the same fabric as that of the plain grey ware is more frequently found. It is comparable to that of chalcolithic Maski [9], Piklihal lower neolithic [10] and Brahmagiri IA [11].

Besides, in a few of these sites, there occurs another variety of plain and painted pottery analogous to that of Savalda [12] of the Tapi valley, in two fabrics viz., the red ware and the grey ware.

Further, remains of ash mounds, such as scoriaceous ash lumps, are scattered in about eight sites [13] including Terdal.

The megaliths of Terdal and the nearby localities are passage chamber tombs, not found in any of the other known site in the Deccan and south India and are thus unique. I have described these types elsewhere [14]. In view of their peculiar architectural features and geographical position, I selected some tombs of the types found in in Terdal-Halingali hill terraces and excavated them under the kind guidance of Dr. H. D.Sankalia in 1965-66.

Near one of the selected tombs in Terdal area, called Megalith I, was a round barrow of inconspicuous height (Fig. I). As is well known, round barrow unbound by circle of stones is one of the megalithic tomb types found in large numbers in the Deccan and south India and particularly in schist zone of Dt. Dharwar, the region under study. Many disturbed megaliths of this type in Dharwar Dt., have yielded pottery and fragmentary iron objects of the kind found in other excavated megalithic sites and burials in Sanganakallu [15], Brahmagiri [16] and Maski [17], during my explorations. Moreover, neolithic burials, excavated hitherto in India, do not have cairn packing of the magnitude usually found in the megalithic round barrows. Now, the round barrow in Terdal has many megalithic passage chamber tombs nearby on all the sides (Fig. I). In view of these facts, it was taken to be one of the megalithic types in the site and was therefore excavated. Contrary to the supposition, the excavation revealed that the burial was absolutely neolithic—containing articulated secondary skeletal remains of apparently one individual, four earthen vessels of neolithic grey ware of the kind found in the habitation sites of the locality, a copper bangle and a few microliths such as crescents and without megalithic pottery and iron—and not megalithic! Further explorations, subseqently, led to the discovery of two more similar round barrows, one about 200 m. east of the excavated barrow in Terdal area and another about 100 m. further east of the second, in Halingali area (Fig. I, No-I in Terdal and No-I in Halingali). The barrow in Halingali was also excavated. But it actually did not contain either skeletal remains or burial furniture, but only a few stray sherds of the neolithic grey ware from the burial pit and of the megalithic fabric from the cairn packing. What follows is an account of the excavated neolithic burials of a new type by virtue of their having cairn packing like that of megalithic round barrows.

The neolithic burial, Terdal

The round barrow is situated about 2 km. east-north-east of Terdal in one of the terraces of the sandstone hills, in between 1925' and 1950' contours. Nearby this barrow are, on all sides, numerous megaliths of the passage chamber tomb types only. No round barrow other than the one in question, is found within a radius of about 200 m. (Plate I ; no. 1, 2. Fig. I). The known neolithic habitation site, Vibhūtimaddi, is about 2 km. west of this and in the plain fields of the black cotton soil. Very faint traces of what may be owing to neolithic camp of very short period, are found near the eastern fringes of the tank of Terdal and about 1½ km. west-south-west of the round barrow. (Fig. 1).

The barrow, unbound by a circle, is roughly circular, 6 m. in diameter on average and about 10 to 12 cm. high at the centre, imperceptibly tailing off to the persent ground level. There was a tree grown in the middle of the barrow

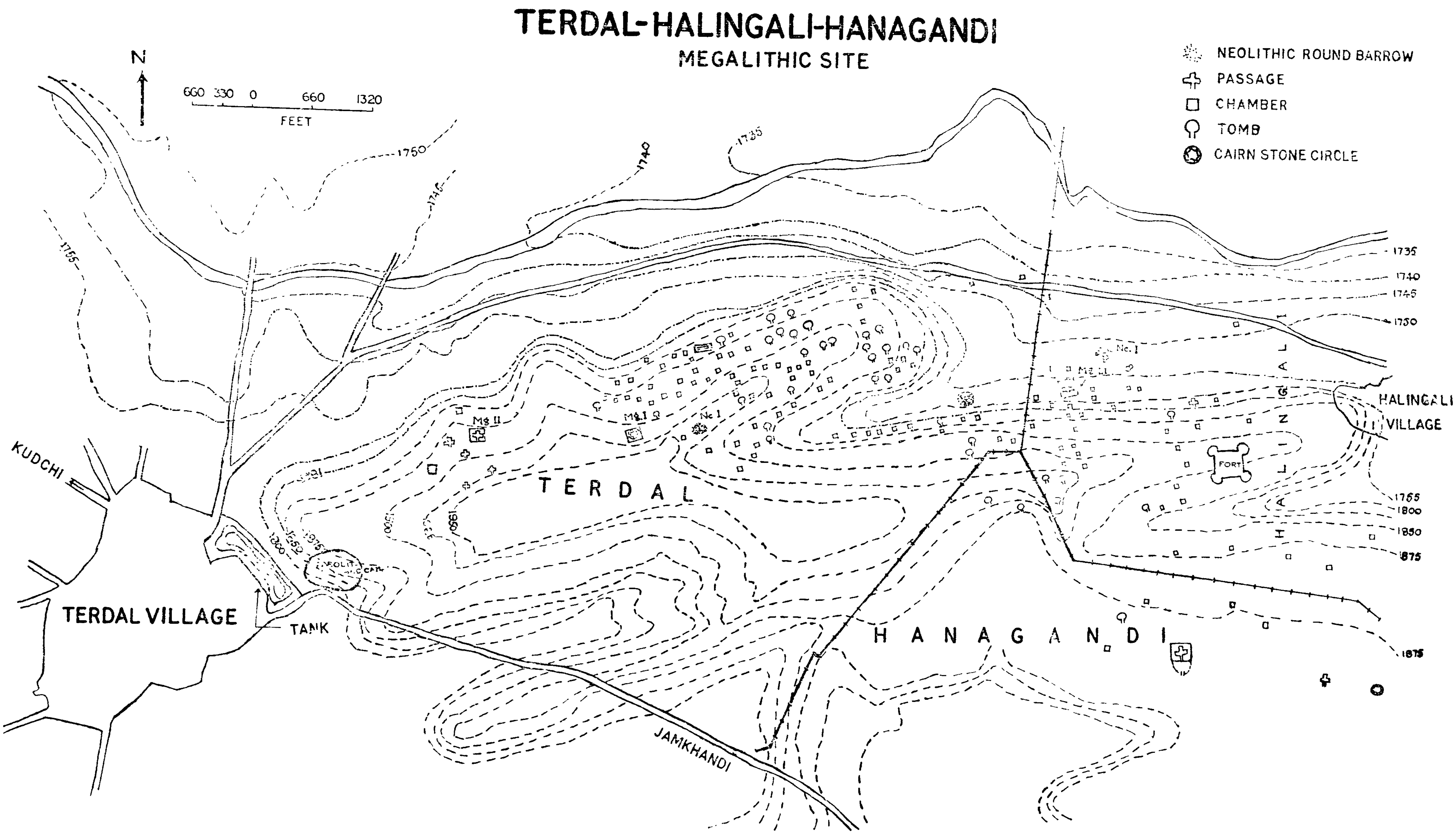

TERDAL-HALINGALI-HANAGANDI
MEGALITHIC SITE
N
660 330 0 660 1320
FEET
NEOLITHIC ROUND BARROW
PASSAGE
CHAMBER
TOMB
CAIRN STONE CIRCLE
TERDAL
HANAGANDI
HALINGALI
HALINGALI VILLAGE
TERDAL VILLAGE
TANK
KUDCHI
JAMKHANDI
FORT
1735
1740
1745
1750
1755
1765
1800
1850
1875

Fig. 1

before excavation. It was cut off in order to get a clear view of the barrow for photograph. The barrow was excavated by quadrant method.

The cairn packing consisted of dark red earth and rubbles of sandstone, about 60 cm. deep at the centre and was immediately overlying a burial pit cut in the sandy red earth accumalated in a hollow of the sandstone rock. The earth of the pit was clayey and yellowish. The pit-line was, therefore, evident owing to the contrast of colours of the earth in and outside the pit.

The pit was ovaloid on plan: 1. 80 m. long, 40 to 60 cm. wide and 30 cm. deep and east-north-east by west-south-west oriented. It is slightly wider at the east-north-east end and is narrow at the other. The bottom of the pit is bed-rock Fig. II.

In the pit are found human skeletal remains, four broken pots, a copper bangle, a parallel-sided flake and two crescents.

Human skeletal remains

The human skeletal remains, consisting of a few fragments of skull, front tooth of the lower jaw and two broken long bones, were fractional, laid in articulated and extended way along the longitudinal axis of the pit, on a 2 cm. thick bed of earth. The skull pieces were in the east-north-eastern part of the pit, while the long bones, near the other end (Plate IV A) These remains are being studied by Dr. K. G. Malhotra, Deccan College Post-Graduate & Research Institute, Poona.

Pottery

The pottery, crushed under the weight of the superimposing cairn, included a small pot with narrow neck and mouth, placed at the end of the long bones (Plate IV A, Fig 3) a bowl between the long bones and a similar pot and another similar pot between the upper end of the long bones and the skull pieces and on the left side of the lay out of the skeletal remains respectively. They are of neolithic grey ware of Maski fabric.

Copper bangle

The copper bangle (Plate III C; Fig 3 7) was rather appropriately kept inside the upper end of the right long bone, where wrist of the right hand would have been in extended positon. It had a green coating of cuppric oxide owing to rusting.

Microlith and parallel-sided blade

There were, in all, two crescents, a parallel-sided blade (Fig 3; 4, 5 and 6) and a bladish flake recovered from the earth of the pit. These were not found placed systematically like the other burial furniture such as pots. From the context of their occurrence, it is difficult to say that all were deliberately interred as burial furniture. At this juncture, it is worthy of note that flakes, fluted cores with well prepared striking platform, parallel-sided blades etc. are sparsely found here and there on these hill terraces. It is likely, therefore, that the microliths might have been there with the earth used for filling the pit.

One of the crescents was lying on the earth just overlying the pot, No. 3 and the other, found in the earth within a pot. The thick parallel-sided blade was found in the earth covering the long bones in between the pottery vessels 1 and 2 and about 2 cm. above the bones. And thick bladish flake of triangular shape occurred in the same part of the pit but about 8 cm. above the bones.

TERDAL-1965
NEOLITHIC BURIAL

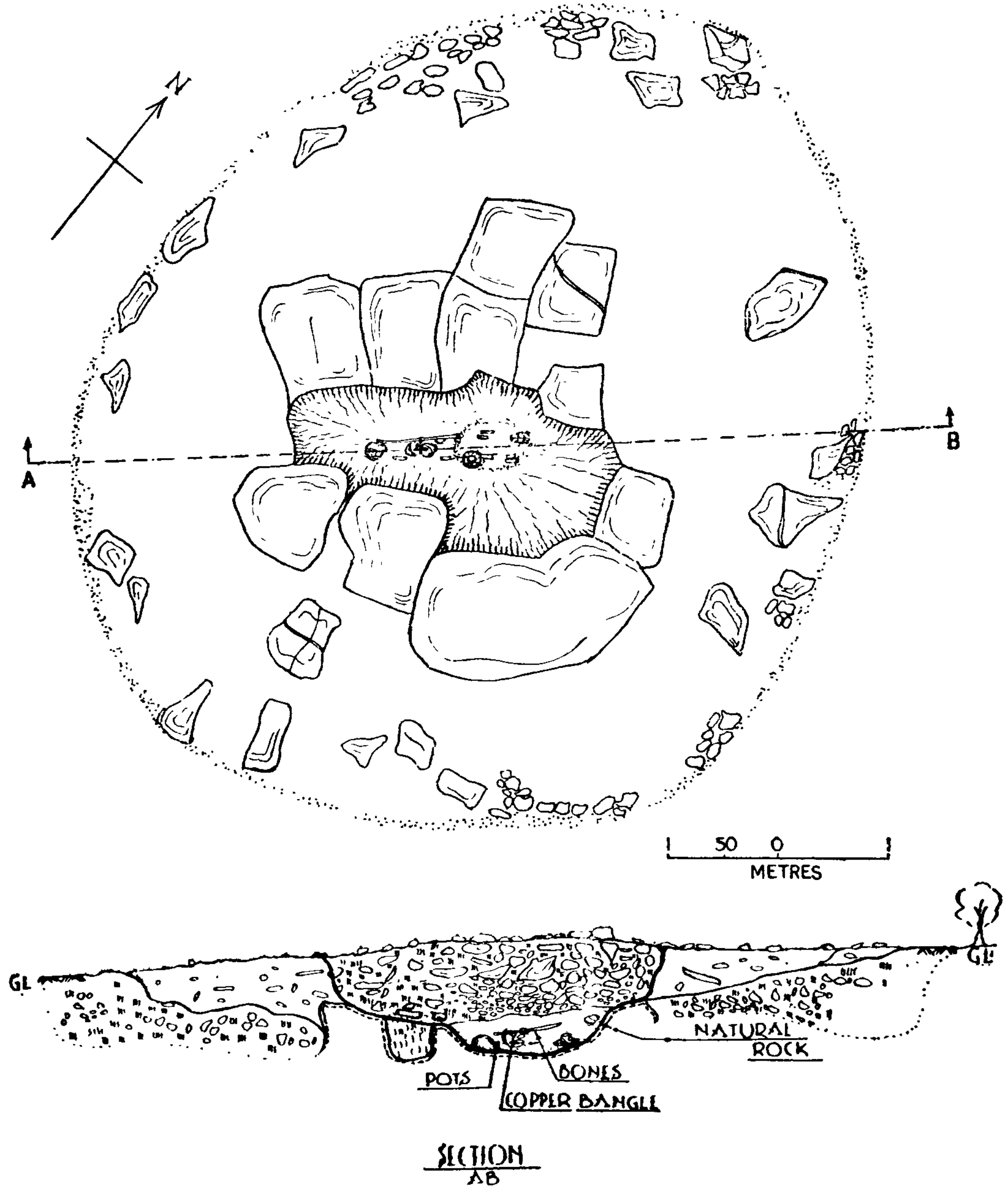


Fig. 2.

Objects from the cairn packing of the barrow

The earth and the stone rubble of the cairn packing yielded a few microliths and some megalithic potsherds.

The microliths were : a fluted core of chalcedony, four parallel-sided blades, two of them having retouch, three bladish flakes and six flakes and fragments, all of chert.

The potsherds were 31 in number—11 of black-and-red ware and 20 of red ware and were very fragmentary. There was no rim sherd in them.

The round barrow at Halingali

This barrow is also roughly circular, about 8 m. in diameter and about 15 cm. high from the ground level. It is about a km. west of Halingali, in a slightly elevated land of 1750 contour at the foot of the sandstone hill range. It is about 200 m. east of the above barrow. On its east, south and west are many magaliths of the passage tomb type (Fig 1, HGL No. 1).

One peculiar feature about this barrow is that there are three short round pillars, one each at the edge of it on the east, south and west.

It was also excavated by quadrant method. The cairn packing consisting of red earth and rubbles of quartzitic sandstone, about 60 cm. thick at the centre, was immediately overlying a pit, elliptical on plan and ronghly east-west oriented, situated almost in the centre of the barrow and equidistant from the pillars of the edge. The pit was 1. 80 m. long and 60 cm. wide in the middle and 40 cm. near the ends and 2 cm. deep. It was, unlike other burial pits, filled with stone rubbles and earth.

Neither skeletal remains nor burial furniture were found in the pit. However, at about 1 m. depth, four neolithic grey ware potsherds of Maski fabric including a small frgamentary out-turned featureless rim of probably a vase were obtained. Again from the south-east quadrant of the carin packing, at about 35 cm. depth, were obtained pieces of a fragmentary megalithic red ware pot.

Mere occurrence of a very few sherds of neolithic grey ware from the burial pit is not enough to take it to be a neolithic burial like the other one described above. Further, the presence of a crushed megalithic red ware pot at 35 cm. depth in the cairn packing is obviously in the first place not due to accident, but probably due to deliberate attempt [18] of interring a broken pot in connection with the burial ritual in the cairn packing some time after its erection. Thus, it does not indicate that the barrow is megalithic. However, since this type of megalithic burial is not found in the site, and if we take Terdal evidence into consideration, this round barrow also seems to be neolithic.

Some observations on the burials

1. The skeletal remains in the burial at Terdal are fractional, but articulated and extended and roughly east-west oriented. Obviously they are of one individual.

2. The pottery is entirely of neolithic grey ware of Maski fabric. Three of them have rounded bottom, globular body, very narrow neck and out-curling, flaring rim with featureless edge. Vessels, with extremely narrow neck of this type, are unusual in the neolithic levels of this region. Fragments of the crushed pot include pieces of two different necks and rims suggesting that the vessel was double mouthed. The bowl has an external ledge on the body, a feature also uncommon in this type from the

other known sites of this region. A piece of a bowl of simialr type was picked up from Vibhūtimaḍḍi neolithic habitation site. The types, therefore, do not have exact parallels from the other sites [19].

4. The presence of copper bangle suggests the chalcolithic stage of the culture represented by the burial, which is otherwise neolithic.

5. Raising of cairn packing of large magnitude like that of the magalithic round barrow type is a unique feature known for the first time from this burial only.

6. The situation on the hill terraces considerably away from the habitation [20] is another peculiar feature of this burial.

Chronology

Raising of the cairn packing over the burial, a typical feature of megalithic burials, the presence of some fragments of megalithic pottery in the cairn packing and the location of the barrow in the midst of megalithic tombs, would apparently suggest that the burial was erected only after the arrival of the megalith builders [21]. Excavation of Megalith I in Terdal near the above burial (Fig. 1) yielded similar pottery. However, in view of the occurrence of the pottery of two different cultures, neolithic and megalithic, respectively from the burial pit and the cairn packing, it might also be possible that the cairn packing might have been added later on by the builder to the already existing burial.

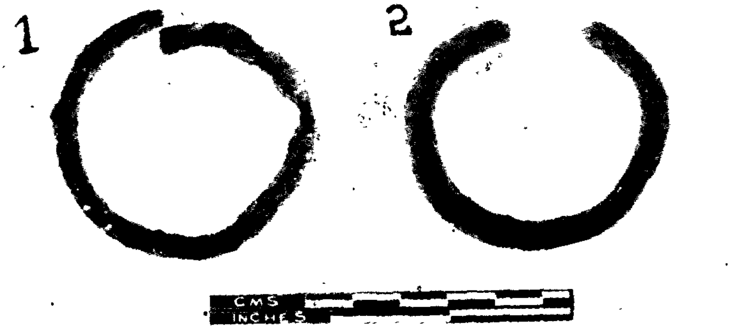
Now, if the burial belonged to a phase when megalith-builders were erecting tombs as it would appear from the circumstantial evidences, it would then suggest either a phase of overlap or a survival of neolithic tradition in the megalithic phase. So far as the former is concerned, it is noteworthy that no megalithic habitation site has yet come to light here or in the surrounding areas, in spite of considerable intensive explorations. In none of the neolithic habitation sites in this and other localities nearby megalithic habitational remains are found. No indications of overlap of the two cultures by way of excavations in this part, for the moment, are available. Regarding the possibility of the survival of the neolithic tradition, it should be noted that while the builder of the neolithic burial could take over the laborious practice of raising enormous rubble packing over the burial from the megalith-builders, it becomes inexplicable the avoidance absolutely of the megalithic pottery and iron objects particularly when copper bangle could be afforded as burial furniture. Further, the pottery does not seem to include anything of the surviving phase. It seems that the megalithic potsherds got mixed with the cairn packing after the burial was erected. It may be mentioned that a few burrows were present in the cairn, which were caused by natural agencies, and this factor may account for the presence of megalthic potsherds in the cairn packing. However, if we rely upon this evidence, we are taking it for granted that the burial and cairn packing belong to one and the same period and the people of the succeding megalithic phase were in no way associated with the Contruction of the barrow under discussion.

The question of adding the cairn packing to the already existing burial is not borne out by the stratigrphay of the burial. There is no sterile layer of soil in between the cairn packing and the top of the undisturbed burial pit suggesting the gap of time.

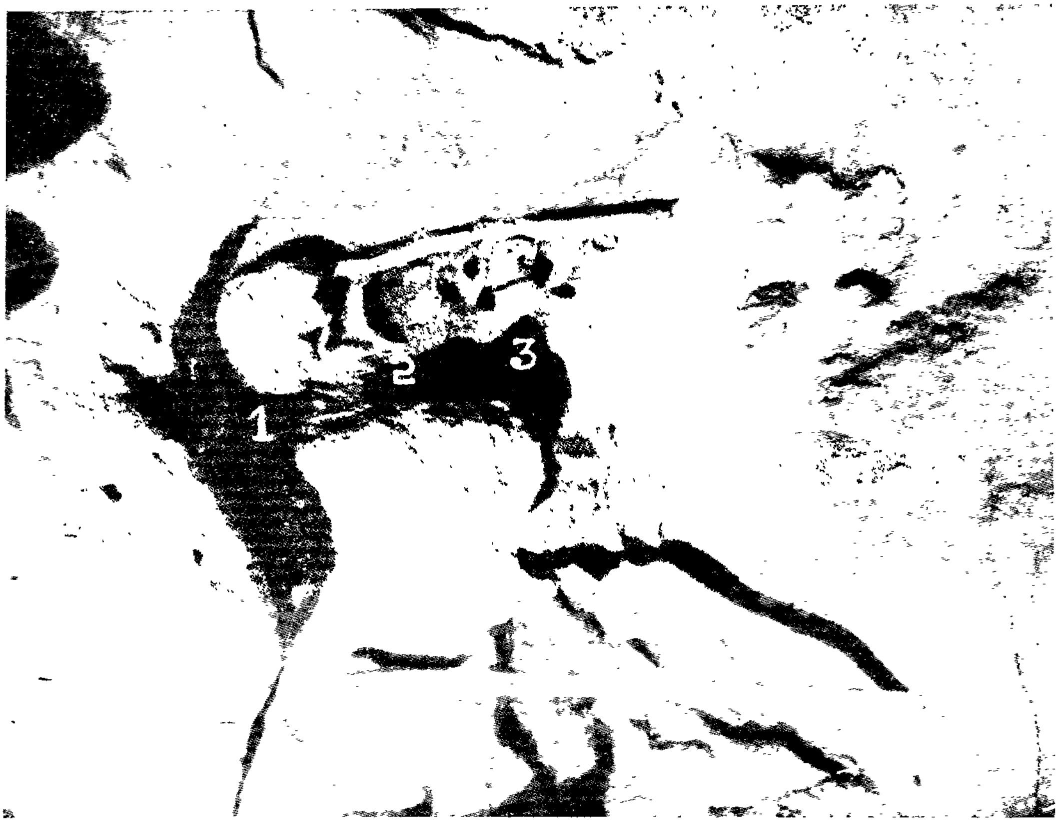
From the above discussion, it is very likely that the round barrow was already there

A. Terdal : Neolithic round barrow with megaliths in the background.

B. Terdal : A neolithic round barrow ; close view.



C. Terdal : Copper bangles : 1. from the Vibhutimaddi neolithic habitation-site ; 2. from the neolithic burial.



A. Terdal : The Neolithic burial.

B. Sunet Sealing

C. A. Vaishṇava Sealing from Jhusi.

before the megalith builders arrived there. That the neolithic people were moving about in these hills is evident from the sparse presence of microliths, parallel-sided blades, fluted cores, flakes and fragments of chert and chalcedony and of the feeble traces of what appears to be camp site near the tank (Fig 1). And when erection of cairn over a burial is intended, naturally, owing to availability of required material for it in the hills, the hill terraces were preferred as burial site away from the habitation area. Probably this practice came into vogue at a later stage of the neolithic period on a small scale, which accounts for the extremely limited number of neolithic round barrows. If there were a few more burials at the foot of the hills, the surface indication of these must have been removed when the land was brought under cultivation.

In the light of the above analysis of the evidences, the round barrow may provisionally be ascribed to a phase immediately preceding the Iron Age megalithic phase, i. e., the late phase of the neolithic culture in the chalcolithic stage before the intrusion of the megalithic culture in this part.

The C—14 datings of the charcoal samples from the earliest two layers [22] of the neolithic habitation site (Vibhūtimaddi) are : 2155±100 (2220±105 , 3720±120 (1770 B.C.) and 3885±100 (1935 B. C.). A study of the antiquities from the surface of many neolithic sites of this part indicates that essentially the cultural characteristics are analogous to those of Piklihal lower neolithic and Brahmagiri IA. It appears therefore that the neolithic culture had ended perhaps a little earlier in this part than in Krishna-Turgabhadra valley where by about 1000—800 B.C. the culture was intruded by the Iron Age megalithic culture. The round barrow may, therefore, be placed somewhere in between 1100-1000 B.C.

If the cultural phase ascribed to the round barrow, as most probably indicated by the present evidences, is proved correct by further work, then here is an instance that provision of cairn packing of large magnitude that can be called literally megalithic goes back to the upper phase of the neolithic culture which becomes a common feature of megalithic tombs of the Iron Age. In other words the earliest megalithic tomb type is the round barrow surviving from the neolithic in this part of Karnatak.

DESCRIPTION OF PLATES AND FIGURES

Figure I.

Megalithic site in the sandstone hill terraces of Terdal, Halingali and Hanagandi villages. Note the situation of the exacavated neolithic barrows No—I in Halingali, in the midst of megalithic passage chambers and also the striking comparative rarity of round barrows.

Plate III

A. Terdal : Neolithic round barrow in the foreground and megalithic passage chambers in the background indicated by two standing persons. Megalith I, is indicated by the farthest person. For the relative position of the barrow, see also Fig. 1.

B. Terdal : Close view of the round barrow after clearance of the tree grown on it, before excavation.

C. 1. A copper bangle from the surface of Vibhutimaddi neolithic habitation site stat.

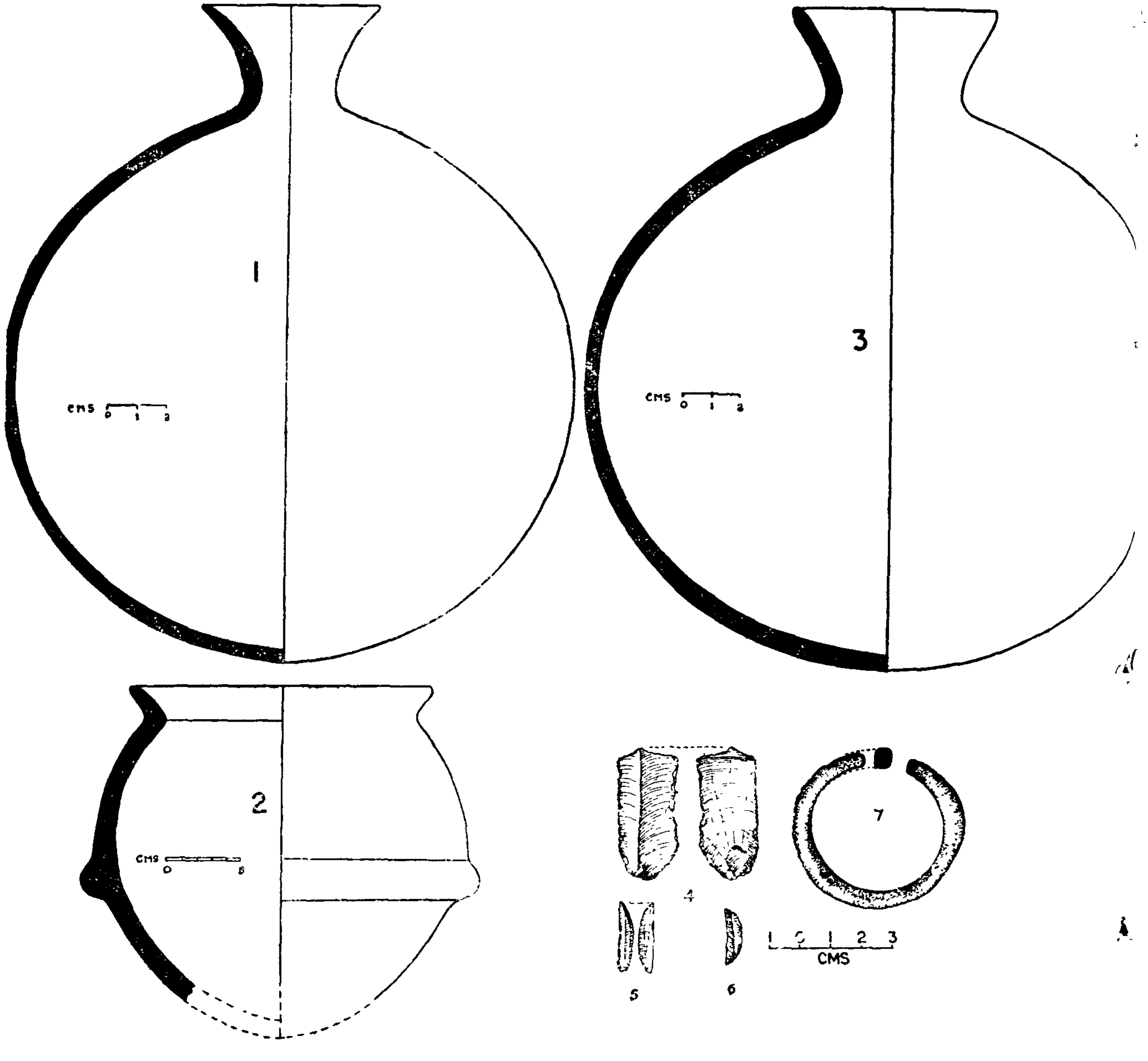


Fig. 3.

C. 2 & Fig 3. 7 : Copper bangle from the excavated barrow. The two ends of the solid copper wire, ovaloid in section, bent into a form of a bangle, are unconnected. It weighs 40 gms.

Plate IVA & Figure 2

The exposed burial at Terdel showing the human skeletal remains and the burial furniture (Nos 1 to 5).

Figure 3

Pottery from the barrow

No. 1. : A medium sized pot with round bottom, globular body, very narrow concave neck, and flaring rim with featureless edge ; of medium to thick section, rather coarse core and blotchy grey slipped externally and slightly burnished and micaceous.

No. 3. : Variant of No. 1. The body is somewhat squat, the neck, still narrower and thicker in section and the rim, slightly out-curling. Micacous dull grey slipped.

No. 2 : A deep bowl with round bottom slightly convex body with an external ledge and short out-turned rim ; medium to thick in section, blackish coarse core and blackish grey slipped.

Fragmentary small pot with squat body, narrow neck and out-turned flaring rim. It perhaps had another similar mouth on the body, like a spout. Of medium to fine core, unevenly thick section and buffish grey. Owing to some missing parts, it could not be reconstructed and illustrated.

Microliths from the burial

No. 4. Parallel-sided blade, thick and broad, of triangular section with slight retouch on the right edge of the ventral surface and chippings on both edges of the dorsal; of dark pinkish chert. Found in the earth about 2 cm above the long bones in between the pottery vessels 1 and 2.

No. 5 : Crescent of chalcedony, with slight retouch on the chord; found in the earth just overlying the pot 3.

No. 6 : Crescent of chalcedony. Found in the earth inside a pot.

Notes

[1] *Gazetteer of Bombay Presidency*, XXIV, Kolhapur, 1886, 374-5.

[2] Ibid.

[3] *Progress of Kannada Research Institute of Bombay State*, 1944-45, 23.

[4] A Sundara, "Protohistoric sites in Bijapur District", *Journ. of the Karnatak University Social Sciences*, IV, April 1968, 18.

[5] *Ibid*, VIII, nos. 94-104, 19,

[6] *Ibid*, IV, nos. 78-87. 18,

[7] S. B., Deo, et. al. *Chalcolithic Chandoli*, Poona, 1965, 33-46.

[8] H. D. Sankalia et. al. *From History to Prehistory at Nevasa*, 1954-55, (Poona), 114-149.

[9] B. K. Thapar, 'Maski : 1954 A Chalcolithic site of the southern Deccan, *Ancient India*, 13, 1957, p. 38.

[10] F. R : Allchin, *Piklihal Excavations*, Andhra Pradesh Archaeological Series, No. 1, (Hyderabad), 1960, 56-58.

[11] R. E. M. Wheeler, "Brahmagiri and Chandravalli : 1947 : Megalithic and other cultures in Chitaldrug District, Mysore State", *AI*, No. 4, 1947-48, 222-4.

[12] S. A. Sali : "A new ceramic of the Chalcolithic from Dhulia District, Maharashtra State", *Journ. Asiatic, Soc. Bombay*, *98*, 1964, 207-10, plate I; figs. 2-5.

[13] They are : 1. Bisnal; 2. Hippargi; 3. Kudchi; 4. Kullolli; 5. Sadalaga; 6. Saptasagara; 7. Shirguppi; 8. Terdal. Nos. 1 (Bilgi Taluk), 2, 4, 7 and 8 (all in Jamkhandi Taluk) are in the District Bijapur and Nos. 8, (Raibhag Taluk), 5 (Chikkodi Taluk) and 6 Athani Taluk), the District Belagaum.

[14] A Sundara, "Some new types of megalithic monuments near Terdal, Halingali, etc, Jamkhandi Tahsil Bijapur Dt. Mysore State", *Quarterly Journal af Mythic Society*, 57, (In press), Bangalore.

[15] B. Subba Rao, *Stone Age Cultures of Bellary*, (Poona), 1948, 11-13.

[16] Wheeler, *op. cit.* 209-20.

[17] *Op. cit* [9], 50-63.

[18] Such post-interments is the cairn-packing of the already existing magalithic burials are occasionally reported. In the excavations of a long barrow in Dec '66, by Shri S. R. Rao, Superintending Archaeologist, Archaeological Survey of India, South-Western Circle, Aurangabad Dn), in the megalithic site discovered by me at Hunnur, Hukkeri Taluka, Belagaum District, Mysore State, small pot-burials were exposed in the cairn packing. I am extremely grateful to Shri S. R. Rao for his kind permission to refer to the excavations.

19] F. R. Allchin, *op. cit.*, 22-3. R.E. M. Wheeler *op. cit.* 202. Nagaraja Rao, *The Stone Age Hill-Dwellers of Tekkalakota*, 1965, (Poona), 27-33.

[20] During my explorations I noticed two neolithic burials; one exposed in the section of a well in Kullolli and another in the section of Bilgi-Bagalkota road-side cutting, very near Bilgi. It is particularly noteworthy that both are about 100 to 200 m away from the periphery of the neolithic habitation sites located there. On the other hand, in the Krishna-Tungabhadra valley, the burials excavated so far at Brahmagiri, Piklihal, Tekkalakota, are right in the habitation sites. See the respective reports referred to above.

[21] Dr. Sankalia visited the site when I was excavating this and other burials there. We, including Shri M. S. Nagaraja Rao of Karnatak University, discussed about the probable phase of this burial. At the end of the excavations, Shri B. B. Lal, the present Director General, Archaeological Survey of India, also visited the site when I explained to him about the burial and showed him the antiquities. In 1967, I had discussed about this burial with Shri K. V. Soundara Rajan, Superintending Archaeologist, Archaeological Survey of India, Southern Circle, Madras, during his visit to Dharwar. I am extremely grateful to all these scholars for their kind suggestions and guidance.

[22] During the excavations at Terdal, I laid a small L shaped trench, 4m by 2m, in Vibhūtimaddi neolithic site which had originally a mound of the habitational debris reduced now to the present ground level. In the excavations it was found that the earliest two layers were, undisturbed from which charcoal bits were collected for dating and sent to the C–14 laboratories of the Tata Institute of Fundamental Research, Bombay.

ACKNOWLEDGEMENTS

The excavations were carried out under the kind guidance of Dr. H. D. Sankalia, the then Joint-Director, Deccan College Post-Graduate & Research Institute, Poona and with financial aid of the Institute. I am therefore immensely grateful to Dr. Sankalia, and to the authorities of the Institute for their kind guidance, aid and permission for publication. The line-drawings of the burial and burial furniture were prepared respectively by Shri S. K. Joshi, Archaeological Survey of India, South-Western Circle, Bijapur, and Shri C. G. Padwal, Draughtsman, Deptt. of Archaeology, Deccan College Post-Graduate & Research Institute, Poona. The photographs of plate III were taken by Shri Krishna Potdar, Shrico, Commercial Artist, Dharwar, at my request. To all these friends I am extremely thankful for their fine work and ready and ungrudging help.

Daimabad—A Rediscovery

by M. K. DHAVALIKAR

Daimabad (Taluq Shrirampur, District Ahmednagar, Maharashtra) is situated on the left bank of Pravara, a tributary of the Godavari. The chalcolithic settlement at this place was discovered by Shri B. P. Bopardikar of the Archaeological Survey of India in 1958. Daimabad is a deserted village now and the name appears to have been derived from *'dālimb'* (in Marathi) meaning 'pomegranate' and consequently Daimabad, according to the local tradition, was once full of orchards of pomegranates. The ancient site is spread over an area of about 50 acres. The bund on the river near the site has actually protected it from the annual monsoonal floods but there is a great danger of the site being completely devastated by contractors digging for earth. In his recent visit to the site, the writer was pained to see that the trucks now regularly reach the site and that a large chunk of the southern part of the ancient mound has been dug out. This is going on incessantly in spite of the site being protected by the Government of India.

The ancient site at Daimabad is unique in several respects. The excavations by Shri M. N. Deshpande of the Archaeological Survey of India in 1959 have brouhgt to lighht several new features of the neolithic and chalcolithic cultures of Maharashtra which, even after ten years, have not been repeated elsewhere [1]. A careful study of the evidence from excavations throws important light on the beginning of the settled life in Maharashtra; its different phases of development and the evolution of the Jorwe culture. It is therefore proposed to analyse the evidence from excavations in which the writer had the good fortune to participate in 1959.

At the outset it is necessary to state briefly the culture sequence at Daimabad. The 20 feet thick cultural debris is divisible into three distinct cultural periods with appreciable overlap in between. The first inhabitants of Daimabad were the pioneering colonizers of Maharashtra. The cultural assemblage of this period has strong affinities with that of the neolithic farmers of the southern Deccan. The principal ceramics are coarse grey and red fabrics, frequently burnished; they are handmade and are sometimes painted with red ochre on rim. Besides, there are large handmade storage jars bearing incised and applique decorations. The occupation is also characterised by ground or polished stone tools, especially axes, and a specialised blade industry. Mention should also be made of perforated ring-stones. There is no evidence of the use of either copper or bronze during this period.

Nothing can be said about the houses of this period, for the excavation was confined to a very small area. They may perhaps be modest constructions with dwarf mud walls supporting wattle-and-daub screens. Patches of floor were noticed at places; they were made of rammed yellow silt. The dead appear to have been buried within the habitation area,

but there is no clear evidence to show whether the burial took place within the courtyard or inside the house. Only one grave belonging to this phase was discovered; it was located within the habitation area. It was rather in a disturbed condition as it was partly cut by a later pit. No burial good was found accompanying the skeleton. But it is not unlikely that the burial furniture might have been destroyed by the later people who cut the pit into it. Moreover, it is also not possible to compare the burial with the funerary traditions elsewhere, particularly in the southern Deccan. Nevertheless the burial constitutes an important piece of evidence for it is the earliest of its kind in Maharashtra.

The earliest cultural phase does not seem to have last long, for very soon a group of people with different cultural traditions appears at the site. The overlap between the two occupational phases shows that both the groups of people lived amicably for some time. But the first farmers of Maharashtra were dominated within a short space of time by the new set of people who, from their cultural equipment, appear to have come from Malwa. This Malwa culture later becomes predominant. As Soundara Rajan observes, "everywhere we see two striking phenomena, that there is a basal matrix, affiliating in a differing degree, with a peninsular "Neolithic' culture essentially of agro-pastoral type, and this is peacefully intruded into by copper using and painted pottery using culture groups of various categories ' [2]. But the stratigraphical evidence is nowhere clearer than at Daimabad.

There are no radio-carbon determinations available to us for building up a chronological framework for the Daimabad evidence. We have, therefore, solely to depend on the cultural affinities of the people with contemporary cultures. For the computation of the time-spread of the earliest cultural phase of Daimabad we have to take into consideration the problem of the two succeeding cultures, the Malwa and Jorwe respectively. The latter two, on the basis of evidence elsewhere in Mahara shtra, can be said to have flourished between 1600—1000 B.C. The first cultural period of Daimabad is therefore pre-1600 B.C. The five-feet thick cultural debris of this period must have taken, as a reasonable guess, about two to three centuries to accumulate. The beginnings of the first period can therefore be placed in the opening centuries of the second millennium B.C. and we may therefore provide 1900-1600 B.C. as the time bracket for the first phase of occupation.

This dating is also supported by the archaeological evidence from the excavations. From their cultural equipment, these first farmers of Maharashtra appear to have come from the southern Deccan. A number of neolithic settlements have been discovered in the Krishna basin and the radio-active carbon determinations show that they can be dated to the end of the third and the beginning of the second millennium B.C. Very probably in the opening centuries of the second millennium these neolithic farmers started moving northwards in search of fresh pastures and new arable lands because of the pressure of a growing population; they possibly came through the Krishna and Bhima valleys to the Godavari-Pravara valleys. This, however, is the probable route of their migration and only further work in the Krishna and Bhima valleys can substantiate this hypothesis.

On the basis of the affinities between the cultural assemblages of the earliest inhabitants of Daimabad on the one hand and that of the

southern neolithic on the other, Allchin has concluded that "this (Phase I of Daimabad) is close to the second or upper neolithic phase of the Karnatak sites to the south than the first phase" [3]. The upper or the secondary neolithic is datable in the later half of the second millennium B. C. and if we accept this dating, the Jorwe culture of Daimabad may well run into the first millennium B. C. The radio-carbon dates show that the Jorwe culture almost vanishes in the beginning of the first millennium. Moreover, the evidence from Karnatak sites shows that the upper neolithic is characterised by the use of copper, albeit on a restricted scale. It appears from the evidence of the black-on-red painted pottery akin to the Jorwe ware that they had already come into contact with Jorwe culture folk of the northern Deccan. In sharp contrast to this, the Daimabad evidence demonstrates that the neolithic people flourished here far earlier than the Jorwe culture folk and that they did not know copper. In fact, the evidence amply makes it clear that it should be equated with the primary of the lower neolithic of the southern Deccan. At the same time it is curious to note that the chronological chart of Allchin assigns 1800-1600 B. C. as the span for first phase of Daimabad which is quite near to that computed by us [4].

In the upper levels of the first phase of Daimabad, painted pottery of the Malwa fabric begins to occur in small quantities. This would only indicate the arrival of a new set of people, who, as their cultural assemblage shows, can be said to have come from central India. A huge painted jar of the Malwa ware constitutes an important find. However, it was not recovered from the stratified deposit but was found on the southern fringe of the ancient mound directly resting on the black cotton soil [5]. This has led the excavator to assign it to the earliest phase of occupation. It may, however, be stated in this connection that the earliest occupational layer resting over the black cotton soil has not yielded any Malwa pottery at least in the stratified trenches. The Malwa folk, who came to the site later, can be said to have settled on the black soil along the periphery of the mound. This was obviously due to the growth in population and the consequent enlargement of the habitation area. Be that as it may, the vase in question is a most beautiful piece testifying to the skill of the Malwa potter-artist. It is a globular jar with a beaded rim and is treated with a pinkish slip on the interior and with a thick buff slip on the exterior which is profusely painted with a jungle scene in two horizontal compartments. The upper compartment shows a muscular figure with two deer approaching it as if enchanted and peacocks in between; the lower has three tigers springing away in opposite direction. The human figure is solid while the bodies of the animals are hatched in broken lines. The whole scene has a telling effect and one feels as if the animals are paying obeisance to their lord, a sort of Paśupati of the later period. Exactly similar animals have been depicted on a vase fragment from Prakash (District Dhulia, Maharashtra) where it was found in Phase I-A [6]. "Such repertoire", according to Thapar, "must have been borrowed from the more ancient cultures in Iran although the present evidence is not sufficient enough to indicate the ancestry or inheritance" [7].

As already stated, there is an appreciable overlap between the first and the second

cultural periods. Soon, however, we find the humble neolithic farmers being dominated by the Malwa people who can be said to have gained supremacy by virtue of their possessing superior weaponry. They had already mastered the technology of copper which they introduced in Maharashtra as the Daimabad evidence would show. Their painted pottery is also a distinct ceramic which is dressed with orange red or buff slip on which the painted ornament is executed in purplish to brown black pigment. Their tool outfit consisted of a specialized blade industry. However, the coarse red and grey wares of the earlier period continue to be used during this period as well.

The novel and unique feature of the Malwa culture that has been brought to light by the Daimabad excavation is the disposal of the dead. Only one burial belonging to this phase was discovered; it was a complete skeleton placed in a speciallv dug pit, in the north-south orientation [8]. It was, however, unaccompanied by any burial furniture. No burial of any kind has so far been reported from any of the Malwa culture sites in central India or elsewhere, and the Daimabad evidence, therefore, is the only of its kind. It thus represents an important feature of the Malwa culture which flourished in the northern Deccan. It may perhaps be a new trait which the Malwa people acquired in this region where the custom was already being practised by the earlier residents of Daimabad. It was therefore a result of the culture contact between the two people.

Another important feature of the Malwa culture which has come to light only by the Daimabad excavation, but has remained unnoticed so for, is the existence of spouted vessels in the Malwa ware [9]. Vessels with tubular spouts are conspicuously absent in the repertoire of the Malwa pottery forms; the only variety of spouts to be met with in this fabric is the characteristic channel spout. It is therefore needless to state that, in the light of the evidence from Daimabad the presence of tubular spouts in the Malwa ware becomes significant. These spouts are usually slightly curved and not straight as those in the Jorwe ware. It is of course difficult to visualize the form of the vessel from the spout. Fortunately there is only one fragment of a narrow mouthed bowl with a featureless rim which has been provided with a tubular spout [10] (Fig. 1-1). This spout, however, is straight. In all probability therefore the slightly curved tubular spout belonged to some other pottery forms. It is necessary to mention here that exactly similar spouts are to be seen in the neolithic pottery of the southern Deccan where they belong to jars with a flaring mouth and a blunt carination on the shoulder. Similar vessels are also present in the Malwa ware and these may perhaps have been provided with spouts. But it is difficult to be difinite on this point as there is no concrete evidence to substantiate it. It therefore seems likely that the Malwa people of Daimabad borrowed the idea of the tubular spout from their counterpart in the southern Deccan. These spouts appear to be handmade as their fabric would show; this also explains the bend in the middle. In sharp contrast to this, the tubular spouts of the Jorwe fabric are straight and were perhaps turned on wheel.

A solitary channel spout of the Malwa fabric has also been reported from Daimabad. This form of spout, however, cannot be said to be a characteristic feature of the Malwa

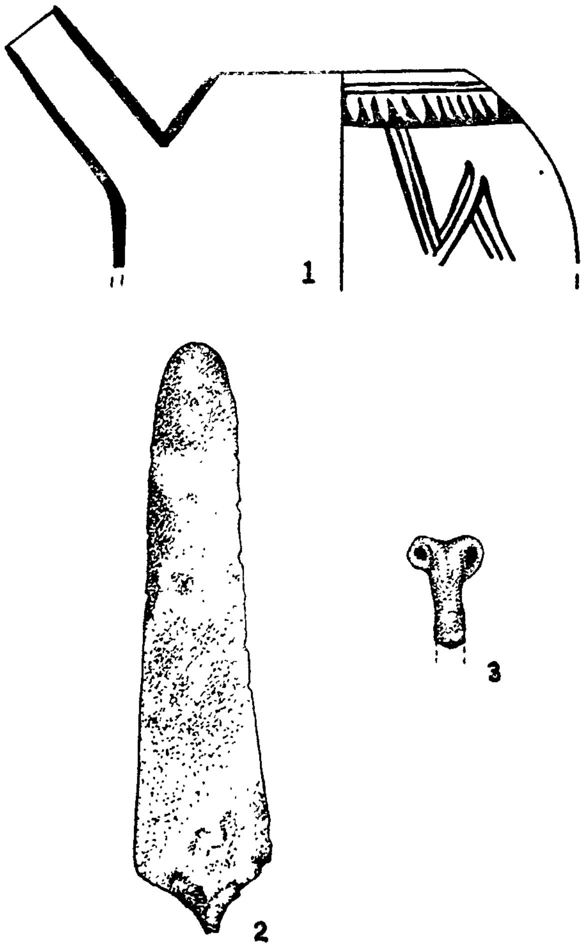
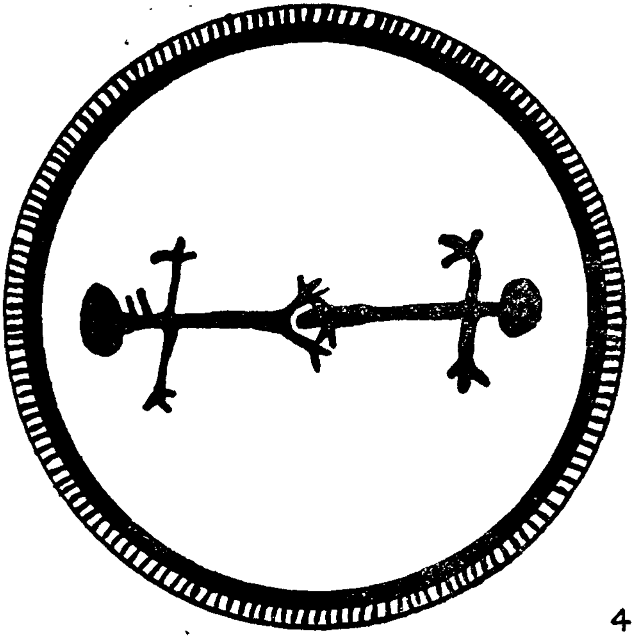


Fig. 1

ware for the simple reason that it is absent at a number of Malwa culture sites in central India and, even at Navda Toli, it begins to occur in the third cultural phase of its occupation. The idea of the channel spout thus appears at a later stage in the development of the Malwa culture. Although Sankalia's suggestion of its west Asiatic origin is plausible [11], it can nevertheless be stated that vessels with channel spouts are not uncommon at the neolithic sites of the southern Deccan. It is also significant that the channel spout in the Malwa ware should occur in Maharashtra where it is reported from Daimabad, Inamgaon, Prakash etc. It is also equally significant that not a single specimen of channel spout should have come to light in spite of three seasons work at Kayatha (District Ujjain, Madhya Pradesh), which is located in the heart of Malwa, not far from Navda Toli. At the same time it is noteworthy that channel spouted vessels in grey ware have been found at a number of sites in the southern Deccan where they are reported from the primary or the lower neolithic levels, the antiquity of which can be stretched as far back as 2300 B. C. [12]. In fact, a careful study of the pottery from such sites as Brahmagiri, Tekkalkotta, Piklihal, Sangankallu, T. Narsipur etc. shows that the channel spout probably evolved from the lipped bowl through the short channel. Even at Daimabad itself we have from the first phase a huge lipped bowl, approximating a short channel, in the coarse grey/red ware. It is decorated with applique designs of finger-tip indentations. The available evidence thus points to the borrowal of the channel spout by the Malwa people from the neolithic farmers of the southern Deccan. Perhaps that is why it occurs as late as phase III at Navda Toli which incidentally has also yielded some Jorwe ware.

It has already been stated above that the Malwa culture people introduced copper at the site. This is, in the main, evident from the fact that copper is totally absent in Period I whereas most of the copper objects that have been found in the excavations are from the second phase of its occupation. It is nevertheless clear enough that copper was extremely scarce. Among the repertoire of copper objects, especial mention should be made of two pieces viz., the knife and the pinhead [13]. Of the



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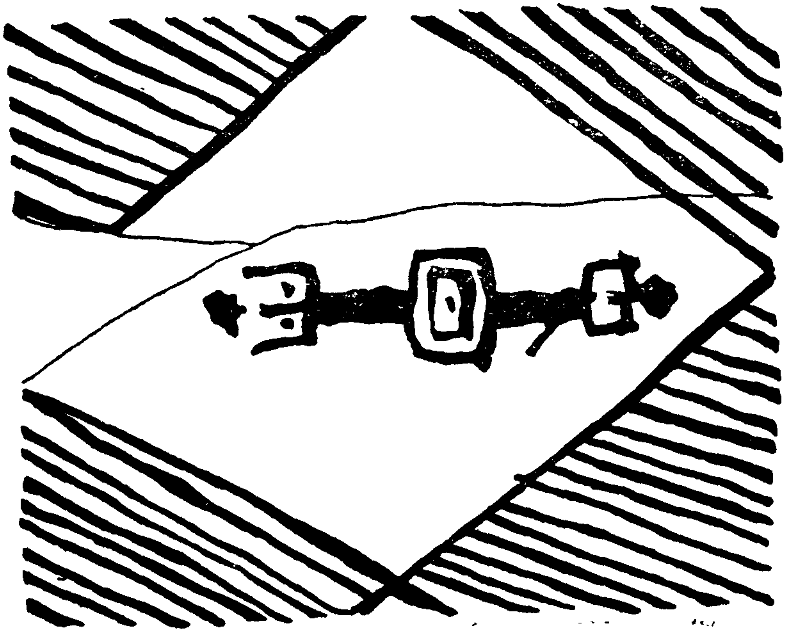

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Fig. 2

two, the knife (Fig. 1–2) has more or less exact parallels at Harappan sites where such flat knives with handles have been found [14]. The parallel is significant and may not be without import. It represents yet one more Harappan element in the make up of the chalcolithic cultures of central India and the Deccan.

The pinhead (Fig. 1-3) is the only of its kind so far reported from chalcolithic sites in central India and the Deccan. This fragmentary specimen, on closer examination, appears to be a spiral headed pin which can be favourably compared with a similar one from the middle Harappan layers of Chanhu Daro [15]. It is possibly a double spiral which, as Piggott has shown, is Iranian in origin [16].

Between the second and the third cultural phases of occupation again there is an appreciable overlap, and the new culture that emerges predominant is the well defined Jorwe culture with all its characteristic features. The red painted Jorwe ware is represented by such distinguished forms as the carinated bowl and the spouted *loṭā* in large numbers. A very interesting vessel of this period is a small bowl with an incurved rim, the interior of which is painted with two human figures, probably a male and a female, in sexual congress (Fig. 2–4). A very similar motif is painted on the interior of a pot from La Quercia in Apulia, a neolithic site in Italy [17] (Fig. 2.–5). The parallel is interesting and significant, but it is well-nigh impossible to say what it means in terms of cultural contact, for they are both far removed from each other in point of time and also space; at best it may represent the migration of the idea of a fertility motif.

The characteristic twin urn burials were found in good numbers. Besides, there was also a multiple urn burial consisting of three urns. They all contained the mortal remains of children while adults were interred in extended posture in a specially dug pit. Of the latter class a very curious burial was noticed in the middle levels of this phase. It was within the habitation area where, instead of digging the pit, the skeleton of an adult was simply placed on the ground. It was unaccompanied by any burial goods. The most noteworthy feature, that was noticed, was a series of postholes, found around the skeleton [18]. They have beeen taken to imply that a sort of canopy was erected over the dead, and the body has been supposed to have been lying in state before the burial. However, the ceremonious burial does not appear to have taken place probably because of some calamity that befell the family of the dead [19]. If the inference is correct, it can be said that the dead body was exposed to sun and rain for a certain period before the ceremonious burial.

A very important feature of the habitation of the Jorwe culture was a sort of embankment that was erected at the site with a view to protecting it from the river floods [20]. However, the excavation was circumscribed by time and resources and it is therefore difficult to know whether the construction was not a form of fortification which is more probable. Nevertheless it remains a unique feature of the Jorwe culture which has not been found at other sites so far. The building of such an embankment or fortification wall implies a tremendous community effort and the resources at command. We do not know whether it was meant for affording protection to the inhabitants from the onslaught of the iron age conquerors.

A most important contribution of the Daimabad excavations is that the evidence recov-

ered is useful in tracing the origin of the Jorwe culture. This has become possible to some extent, by the threefold evidence of cultural sequence which has not so far been obtained from any other site. The coarse red and grey wares, which are associated with the Jorwe fabric, undoubtedly constitute a contribution of the southern neolithic farmers. The black-on-red painted pottery which is a distinguishing feature of the Jorwe culture has some characteristics in common with the painted ceramic of the Malwa fabric. It would rather be too superficial to observe that the tradition of painting in black over red surface is shared by both. But on closer examination it becomes apparent that there are many elements which are common to both. Thus the concave-sided carinated bowl can be taken to be derived from the bowl in the Malwa ware which is rather deep and has blunt carination [21]. Similarly the *loṭā* with a squat bulging body and high neck has a corresponding form in the Malwa ware [22]. The globular jar with a short or high neck is also paralleled in the Malwa chalcolithic [23].

The spouted vessel which is so characteristic of the Jorwe ware is, however, conspicuously absent in the Malwa ware. Spouted vessels, though rare in early Indian pottery, are to be met with in the southern neolithic pottery. In fact in the secondary neolithic of Brahmagiri, to quote (Sir) Mortimer Wheeler, "spouts are a familiar feature throughout the IB phase of the Brahmagiri stone axe culture" [24]. It is very tempting to compare T-46 of Brahmagiri, which is a *loṭā*-shaped vessel, with round bottom, out-curved rim and a slightly curved tubular spout [25]. But the nearest parallel, in form and function, is from Tekkalkotta, a neolithic site in the southern Deccan in the Krishna valley. It is reported from the earliest level, phase IA, representing the early neolithic strata assigned to the middle of 1800 B. C. on the basis of radio-active carbon determinations [26]. It seems most likely that the spouted vessel of the Jorwe ware is an imitation of its neolithic prototype. It, therefore, appears that the Jorwe culture was born out of the synthesis of the southern neolithic on the one hand and the Malwa chalcolithic on the other. The fusion of these two cultures took place most probably in the first half of second millennium and the locale, in all probability, was the Pravara-Godavari valleys, for it was only at Daimabad that we find all the three cultures.

The foregoing analysis of the evidence recovered from Daimabad excavations amply brings into relief the salient features of the site as also its importance which remained unnoticed so far. The site is of unique importance inasmuch as it has established for the first time a purely neolithic substratum in the prehistory of Maharashtra. It is needless to mention that the poineering colonizers of Maharashtra were the neolithic farmers from the southern Deccan who probably moved northwards from the Krishna valley to the Godavari basin through the Bhima valley probably because of the increasing pressure of population and in search of new arable lands and fresh pastures. They selected the Pravara-Godavari valley, which appears to have been endowed with a most favourable environment. The chalcolithic sites such as Daimabad, Nevasa and several others in the Pravara-Godavari valleys are located in a vast stretch of alluvium which is over three metres in thickness. This unusual accumulation of alluvium abuts against the steep scarp of the Ahmednagar plateau. This escarpment of the southern divide of the Pravara Godavari does not appear to be erosional but seems to have had its

origin in tectonic movements [27]. The rich alluvial stretch was probably characterised by thin vegetation and was well watered by the Godavari and its tributaries. It is therefore no wonder that the earliest farmers of Maharashtra were attracted by this most congenial environment.

The Malwa culture people arrived at the site sometime before the middle of the second millennium B. C. They appear to have got themselves naturalized in this region, so much so, that they adopted the novel custom of burying the dead. They also can be said to have borrowed the idea of the spout from their predecessors at Daimabad. This process of cultural fusion probably led to the birth of the Jorwe culture. All this would show that the ancient site at Daimabad is of great importance. It was only a season's work which has brought to light so many new features of the neolithic and the chalcolithic cultures that flourished in the Pravara-Godavari basin which incidentally was also the cradle of civilization of Maharashtra in the historic period. As already stated, the site is considerably extensive, and it can be said without any hesitation that, if excavated on a larger scale, it may yield evidence of crucial importance and throw light on the beginnings of settled life in Maharashtra.

Notes

[1] *Indian Archaeology : 1958-59-A Review*, 15-18. (Hereinafter this publication has been abbreviated as *IAR*)

[2] "The Devolution of the Peninsular Neolithic Culture-An Analysis of the Ceramic Influences", Paper submitted to the seminar on 'Pottery' at Patna, 1969 (unpublished).

[3] Bridget and Raymond Allchin, *The Birth of Indian Civilization*, (Harmondsworth), 1968, 192.

[4] *Ibid*, 196.

[5] *IAR 1958-59*, 16-17, Pl. XXII, B.

[6] "Prakash, 1955 : A Chalcolithic site in the Tapti Valley," *Ancient India*, No. 20-21, 1967, 48, Fig. 12, 3.

[7] *Ibid*, 35

[8] *IAR-1958 59*, 18, Pl XXIV, A.

[9] The recent excavations conducted by the Deccan College, Poona at Inamgaon (District Poona, Maharashtra) have also yielded similar tubular spouts in the Malwa ware.

[10] *IAR-1958-59*, 10, Pl. XXIII, B.

[11] "New Light on the Indo-Iranian or Western Asian Relations between 1700-1200 B. C.", *Artibus Asiae*, XXVI, 1963, 314.

[12] For a discussion of channel spouts in the southern neolithic see I. Karthikeya Sarma, "Painted Pottery from Pusalpadu, Andhra Pradesh and further Explorations in the Cuddappah and Kurnool Districts", *Indica*, 4, 1967, 87.

[13] *IAR-1958-59*, Pl. XXI, B-2 & 3.

[14] E. J. H. Mackay, *Chanhu-Daro Excavations*, (New Haven, Conn.), 1943, Pl. LXIX, 2.

[15] *Ibid*, Pl. LXVIII, 9.

[16] Stuart Piggott, *Prehistoric India*, (London), 1962, 227. For an excellent illustration of a double spiral heaped pin see Mortimer Wheeler, *Indus Civilization and Beyond*, (London), 1966, 51-52, Fig. 73.

[17] O. G. S. Crawford, *Eye Goddess*, (London), 1957, 42, Fig. 11.

[18] *IAR-1958-59* Pl. XXIV, B.

[19] *Ibid.* 18.

[20] *Ibid.*

[21] H. D. Sankalia and others, *The Excavations at Maheshwar and Navda Toli 1952-53*, (Poona), 1968, Figs. 15-19, Types 19-21.

[22] *Ibid.* Fig. 42, Type 53.

[23] *Ibid.* Type 2.

[24] "Brahmagiri and Chandravalli, 1947 : Megalithic and other Cultures in the Mysore State," *Ancient India*, No. 4, 1947-48, 224.

[25] *Ibid*, 228.

[26] M. S. Nagaraja Rao, *Stone Age Hill Dwellers of Tekkalkotta*, (Poona), 1965, 41, Fig. 17—A.

[27] G. Corvinus, S. N. Rajaguru & G. G. Mujumdar, "Some observations on the Pleistocene ecology of Western Maharashtra" (unpublished).

A Note on a Knot Design from Mohenjo-Daro and Its Occurrence in Later Times

by H. SARKAR & B. M. PANDE

A copper tablet having on one face an intertwined symbol (Fig. 1) and on the other an inscription, comprising four letters in the Harappan script, was discovered by Marshall at Mohenjo-daro. This unique tablet (no. VS 3526) came from Room 30, House 1, VS Area and belonged to the Late Periods [1]. Subsequently, another copper tablet (no DK 3696) having an exactly similar symbol on one face was discovered by Mackay from DK Area, G. Section [2]. Both the tablets have a squarish outline, having almost similar dimensions. The latter, however, differs from the former example in that it has an additional line of three letters (or symbols) above the four-symbol inscription, which is common to both; the common line, according to Mackay, was an afterthought.

In the historical period, an almost identical symbol occurs on a "terracotta stamp with incuse devices" found in the Jandial temple at Taxila [3] Ascribable to early Christian era, the stamp, about 2.37 inches in length, is made of brownish-red sandy-clay and has a conical handle. Needless to say, the device or symbol on the Taxila stamp is similar to the earlier two examples from Mohenjo-daro - the additional feature being a dot in each of the four knots and four dots in a vertical row in the centre, besides a borderline enclosing the motif

The same intertwined knot design appears to have gained some popularity in the Gujarat region during the rule of the Rāshṭrakūṭa kings. The following copper-plate grants from Gujarat contain the symbol, mostly along with the king's signature.

(i) The Kavi plates of Govinda (*Indian Antiquary*, V, 1876, 113). Here the symbol appears along with the royal signature. The inscription attests to the prevalence of Sun worship.

(ii) The Surat plate of Karkkarāja Suvarṇavarsha of Gujarat, dated Śaka 743 (*Epigraphia Indica*, XXI). Two such symbols occurring at the end of the inscription have been interpreted by the editor as *pāda-chinhas* symbolizing the foot-prints of Mahāvīra. The king, who was a staunch Śaiva, gifted a field to a Jain *vihāra*.

(iii) The Devali plates of Govinda, dated in the Valabhi year 500 (A. D. 818-19) (*Epigraphia Indica*, XXXV). It has been interpreted as *kolam* or *rangavalli* design still in vogue in south India.

(iv) The Prince of Wales Museum plates of Govindarāja, Śaka 732 (*Epigraphia Indica*, XXVI). The symbol is called here as an ornamental device after the royal signature

(v) The copper-plate of Dhruva II, dated Śaka 806 (*Epigraphia Indica*, XXII). It has been interpreted as an ornamental symbol flanked by double *daṇḍas*.

(vi) The plates of Dantivarman of Gujarat, Śaka 789 (*Epigraphia Indica* VI).

KNOT DESIGN FROM MOHENJO-DARO

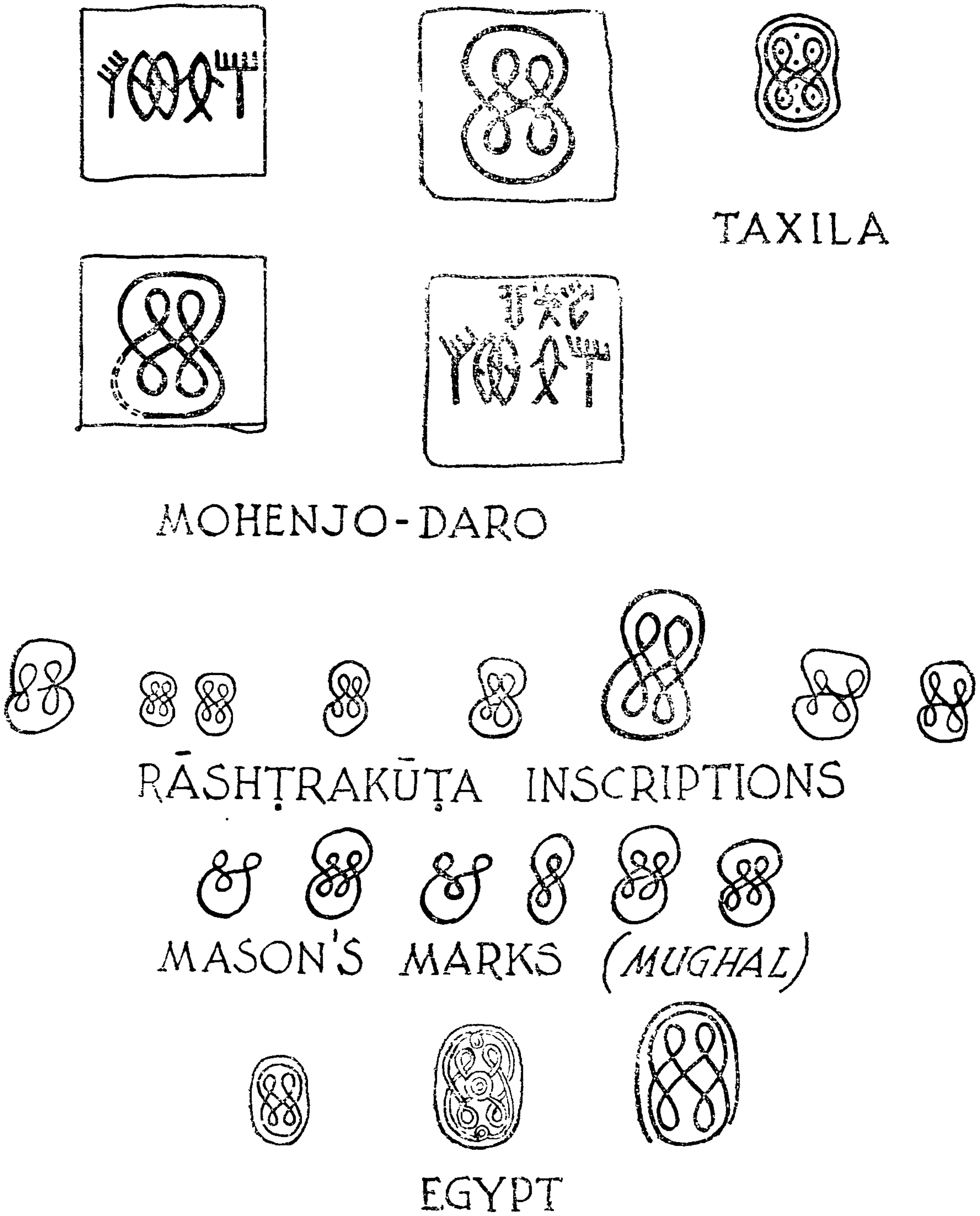


Fig. 1

The symbol occurs twice after the last line and a *śaṅkha*-design is incised below the first one.

All the copper-plates mentioned above are from the Gujarat area, and fall in the period between A.D. 810 and 884. It is worth noting that in all the examples the symbol occurs as part of the signature of the issuer of the grants. In the copper plates of Govindarāja, Dhruva II and in the inscription from Kavi, it follows the donor's name, generally preceded by the expression *svahastoyam*. The detail in respect of the name of the scribe etc., is generally given after the signature and the symbol.

It is clear from the foregoing that the design, occurring for the first time on the copper tablets of the Harappan period, reappears in the historical and early medieval periods. That it did not go out of use after the early medieval times is evident from its occurrence as a mason's mark in the Mughal buildings at the Taj Mahal, Fatehpur Sikri and in the walls and buildings in the Allahabad Fort [4]. As a matter of fact, it survives till today as a favourite *raṅgavalli* motif in south India [5].

The evidence marshalled above will leave no doubt as to its sporadic character, for it has neither a historical continuity nor a uniform geographical distribution. Furthermore, at no period of its history in India, as its low incidence shows, the symbol attained any measure of popularity comparable to that of the *svastika*, spiral, or lotus. Of the Harappan sites, Mohenjo-daro alone has produced this particular type of knot design; in fact, the knot design itself is rare in the Harappa culture. Even the occurrence of the knot design, in general, in the Jhukar and the chalcolithic cultures of central India and the Deccan is not of much significance [6]. But particularly interesting is the fact that the knot design appears as graffito, for the first time, in the chalcolithic cultures of central India and the Deccan.

The endless knot pattern has a wide distribution in the areas of the 'fertile crescent'. An almost identical design is engraved on the scarabs dated between the thirteenth and the seventeenth Dynasties of Egypt [7]. According to Mackay, "very similar designs of looped and endless cord" are found on a pre-Dynastic jar of the Middle Period in Egypt. After citing a few more analogies, Mackay says that "though the pattern is not exactly the same as the one from Mohenjo-daro the resemblance is so close that these designs look to have had a common origin" [8].

It is not easy to find out the significance of this knot-and loop design which might have evolved from the magic of knots, so common not only in the primitive but also in some of the evolved cultures on the ancient world [9]. The endless cord, according to Mackay, is a symbol of longevity ; whether the same significance was attached to it by the authors of the Mohenjo-daro copper tablets is difficult to say till the Harappan script is deciphered. The tablets, identified variously as seals, currency or amulets, conform to three regular sizes, viz , squarish, broad rectangular and narrow rectangular Again, one of their faces contains, generally, an animal or a human figure or even a design or symbol, whereas the other face bears a legend in the Harappan characters. The uniformity in regard to size

and depiction of the animals etc. (the animals invariably face right) points towards a certain amount of standardization; the extreme variation in weight, however, precludes the possibility of their being used as currency. That they were not used as seals is indicated by the low depth of incisions. Yet, the regularity in sizes, the recurrence of same devices with similar inscriptions, the use of permanent material like copper etc., may tend to show their use as family or guild tokens.

But the purpose of the copper tablets does not explain the significance of the knot device on the obverse. It may just be a magical or suspicious symbol adopted as guild-mark The use of knot design after the royal signature in the Rāshṭrakūṭa records of Gujarat might have had the same significance although here it may be identified as *pāśa* suggesting royal authority. However, whether the *pāśa* can be connected with royal authority is a question that needs explanation. It is well known that *pāśa* is an attribute of Varuṇa "the god who binds" and the lord of the western quarter [10]. His intimate connection with water also cannot escape one's notice as his *vāhana* swan or *makara* indicates. *Śaṅkha*, appearing with the knot design in the Rāshṭrakūṭa inscription, is also an attribute of Varuṇa, and suggests, at the same time, his connection with sea. In the *Ṛigveda* he is the guardian of truth as expressed by speech, and he is practically a moral god to whom prayers for forgiveness are offered by the hymnists. Thus, the use of this symbol after the royal signature carries behind it the authority and truthfulness, and both these aspects might have been connected with the knot-design on the copper tablets from Mohenjo-daro and tend to show their use as authenticated tokens in commercial transactions.

Notes

[1] Sir John Marshall, *Mohenjo-daro and the Indus Civilization*, (London), 1931, III, pl. CXVIII. no 5; described in Vol. II, 400.

[2] E. J. H. Mackay, *Further Excavations at Mohenjo-daro*. (Delhi, 1937, I, 364-65 and pl XCIII, no. 4 in Vol. II.

[3] Sir John Marshall, *Taxila*, (Cambridge), 1951, II, 437 and III, pl. 204 k.

[4] A. Gorham, *Indian Mason's Marks of the Moghul Dynasty*, (London), p. 9, nos. 40 and 41, p. 14, nos. 38-40 and p. 23, no. 71.

[5] *Raṅgavalli* is a term generally used in Maharashtra to signify the art of decoration by dry or wet pounded rice, sometimes even coloured, on the floor of the courtyard. In the north it is used on festive or ceremonial occasion, while in the south it is a daily ritual. In Hindi, it is called *rangoli*, in Tamil *kolam* and in Bengali *alpanā* (in the Kumaun hills it is known as *aipana*). Every such motif has its name in the Tamil country and the endless cord designs have the suffix *muḍi* or knot. A device, very much similar to the peresent ones, has been called *Brahma muḍi*. See, *Kalaikklanjiyam*, IV, (Madras), 1956, 329-33. *Brahma-muḍi*, according to the *Tamil Lexicon*, V, part I, 2687, published by the University of Madras, (Madras), 1932, is a knot of *darbha* grass (*kuśa*) used at a sacrifice.

[6] For Jhukar, see Ernest J. H. Mackay, *Chanhu-daro Excavations*, (New Haven), 1943, 142 and pl. L, nos. 4 and 4a. For graffiti, see B. B. Lal, "From Megalithic to Harappa: Tracing back the graffiti on pottery", *Ancient India*, No. 16, (New Delhi), 1960.

[7] Flinders Petrie, *Buttons and Design Scarabs*, British School of Archaeology in Egypt, Twenty-fourth year, 1918, XXXVIII, (London), 1925, pl. VIII, 128-130.

[8] Mackay, *op. cit.*, 364-365. According to him "it is to be found on beads of the etched carnelian type, both in Sumer and in the early Indus Valley, and is also known in early Cappadocia."

[9] For the symbolism of the knots, see Mircea Eliade, *Images and Symbols*, Studies in Religious Symbolism, (London), 1961, Chap. III-The "God who Binds" and the Symbolism of Knots, 92-124. Among the Indo-Europeans, the cords and knots have an importance for "the funerary divinities and the demons, and the magical use of 'binding' in popular medicine and sorcery". The symbol is also included as one of the Eight Glorious Emblems in Tibetan Lamaism and is considered as the "mystic diagram symbol of the endless cycle of rebirths." See, Antoinette K. Gordon, *The Iconography of Tibetan Lamaism*, (revised edition), (New York), 1967, 8-9.

[10] For the symbolism of Varuṇa *vis-a-vis* the knot see, Mircea Eliade, *op. cit.*, 95 ff.

Two Relic-Caskets from Mathura

by P. K. AGRAWALA

Through the kind courtesy of Dr. N. P. Joshi, Director of the State Museum, and his colleagues I recently had an opportunity to see and examine two relic-caskets of Mathura, now deposited in the State Museum, Lucknow. The two caskets, one of steatite and the other of crystal, in fact, represent a set of *dhātu-mañjūshās* as the latter (i.e. of crystal) was contained within the former (that is of steatite). For the two photographs (which show the lid of the steatite casket as detached and placed separately) accompanying the present note, we are thankful to Mr. O. P. Khaneja, Photographer, Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University.

Many such reliquaries and relics are known to have been found from the inside of a number of ancient Stūpas, mainly Buddhist, all over the country. For studying the attainments of minor arts and crafts in ancient India these precious and small antiquities provide a rich material that has been discovered from time to time from excavations of Buddhistic edifices at Piprahwa [1], Sanchi [2], Bhattiprolu [3], Amaravati [4], Nagarjunakonda [5], Pitalkhora [6], Sopara [7], and many a other site [8].

In this light it seems likely that the two reliquaries described presently from Mathura were also discovered from an ancient Stūpa, and were employed for deposition of sacred relics or *dhātus* that were enshrined in the heart of that Stūpa. For the safe preservation of *Śarīra-dhātus*, together with some other pieces and tiny articles of ceremony, it had become customary to have a set of several reliquaries in varying shapes and sizes and also in different materials (such as crystal, gold, silver, steatite, other soft and hard stones, and pottery). The elaborate scheme and ingineous devices followed in the deposition of sanctified symbols and bodily relics in the heart of a Stūpa are amply known and explained more or less in their in tact and undisturbed preservation from the excavations that were carried out at Piprahwa, Bhattiprolu and Nagarjunakonda. The smallest of the caskets, which is usually a gold or crystal one, is found to contain sacred pieces and relics. It is, according to the practice or presumably some ritual, often found emboxed carefully in another casket, large enough comparatively to have inside it the first one. Thus in successive order according to the sizes the caskets are placed within one another, the largest receptacle being often in pottery.

Unfortunately we have no information recorded with respect to the contents, if any, of the two Mathura caskets (Pl. V A & B). A slip attached to them furnishes the following details regarding their place of discovery :—

Mus. No. 66·145 : discovered from the Chaubara Mound, Mathura. In the excavation of 1887-88.

From Cunningham's *Archaeological Survey Reports* (Vol. III, Calcutta, 1873), we are informed of a number of antiquities that were obtained from the Chaubara mound or mounds. Besides a small gold casket found in 1869 [9],

Cunningham during his work in 1871-72 found from mound A at Chaubara a steatite relic-casket of unusual shape exactly on the ground level in his excavation of a brick structure judged by him to represent a Buddhist Stūpa. [10] A line-drawing of this reliquary, in want ot any other information aboubt it, is reproduced here (Fig. 1) from Cunningham's illustration of it.

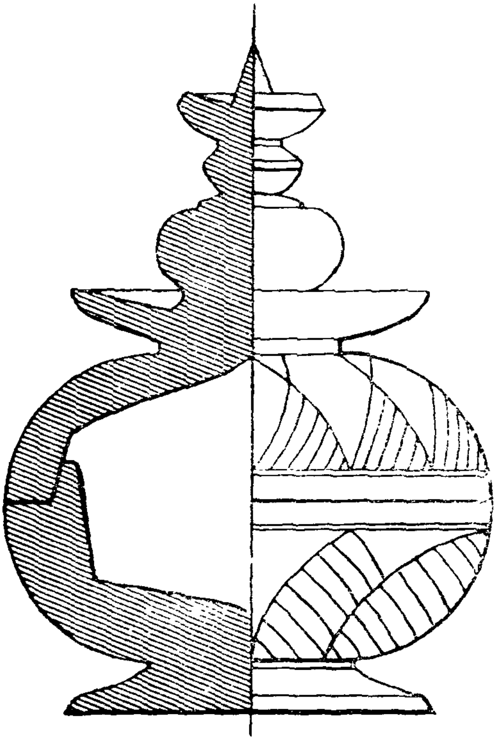


Fig. 1 Line-sketch of a steatite casket, found by Cunningham from Mound A, Chaubara.

Its comparison with the new steatite casket described below will be useful.

From the antiquities brought to light at the Chaubara mounds Cunningham concluded them to be Buddhist. (Cf. A large lion-capital now in the Indian Museum ; M 14 ; several fragments from a colossal Buddha statue.) [11] It is known that subsequent to Cunningham's work, Mr. Growse explored one of the Chaubara monnds, i. e. No. A, and discovered several antiquities of value that go to prove beyond doubt the existence of an ancient Stūpa on the site. [12] Some Kushāṇa pillars, railing cross-bars and rail-upright No. J 7 (Mathura Museum, showing Ṛishyaśṛiṅga figure on its one side and panels with scenes on the other) discovered by him from the same mound presumably belonged to the complex of a Kushāṇa Stūpa. An inscription (on a detached pedestal from some lost Buddha statue), dated in year 33 of Huvishka's reign shows that the Stūpa was in existence in the Kushāṇa period [13]. But Mr. Growse appears to have discovered no reliquaries from his digging at mound A, Chaubara [14], as he has mentioned nothing in this regard.

In shape the steatite casket is spheroidal and is made in two segments (as shown in the illustration placing them separately). The lower piece in its upper portion has a grooved section into which the other segment fits as the lid. Within it the smaller casket of crystal

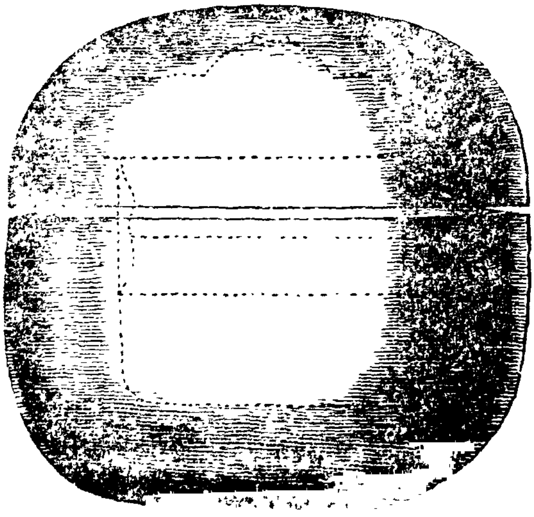
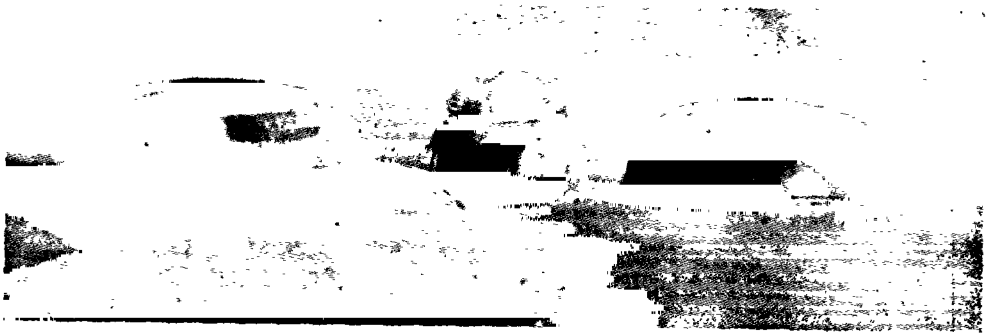
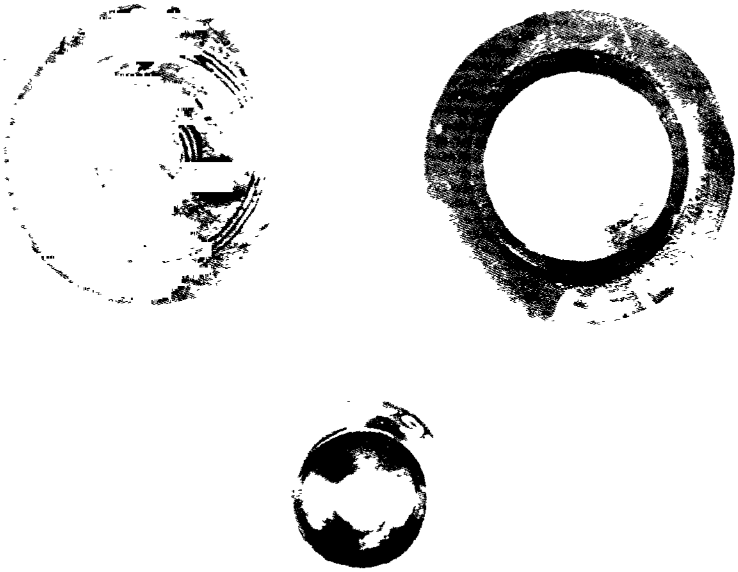


Fig. 2 Spheroidal stone casket from Bhaṭṭiprolu. After A. Rea.

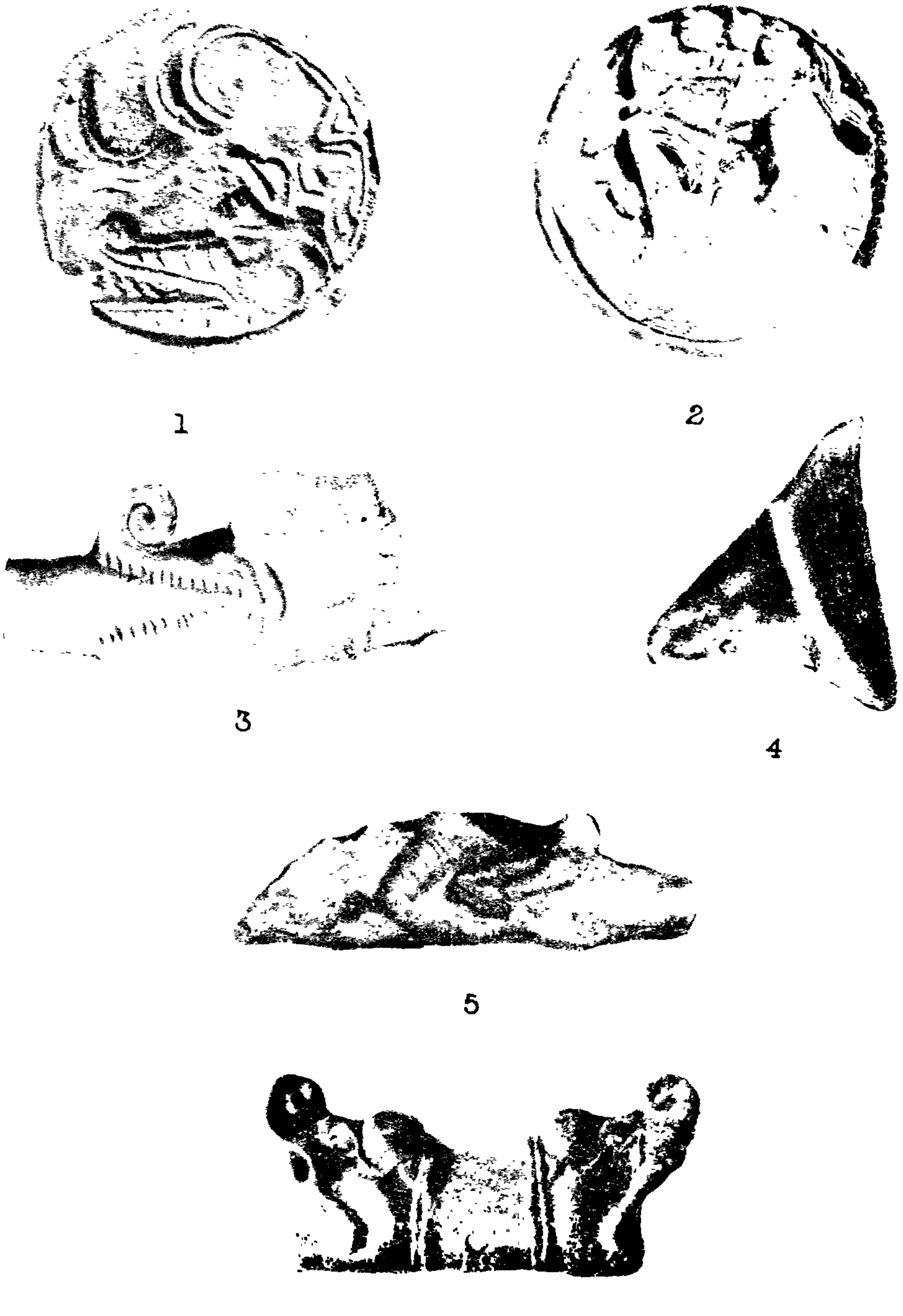
PLATE V



A. Two relic - caskets from
Mathura. In the State Museum,
Lucknow. No. 66.145.,



B. Same. View from the top.



Makara - mukhas : 1 Kausambi, 2. Bharhut, 3. Rajghat, 4. Kumrahar, 5. Vaisali and 6. Nevasa.

was emboxed and it presumably had contained some minute pieces or sacred relic-bones in it. Here attention may be drawn to a somewhat similar globular stone casket discovered by A. Rea in his excavations of the Bhattiprolu Stūpa [15]. Besides the evident difference in size (and also in date), these two stone reliquaries, one from Mathura and the other from Bhattiprolu, may be said to represent a type which was inspired from a wooden prototype. Other seatite relic-caskets of similar type have also been found at Vaisali (from the heart of a Buddhist Stūpa; datable to B. C. 200) [16] and Taxila [17].

The inner reliquary of crystal represents a "phial"-shaped *Karaṇḍaka* with a lid. It is comparable in shape to a pottery *gaṛhā* of the present day ; with a difference with respect to its base which is flattened. A similar crystal casket has been recetly discovered from Amaravati, along with four others representing other shapes [18].

Both of the caskets are products of skilled workmanship and show remarkable finish with high polish. Keeping in view the date of other stone pieces and sculptures discovered from the Chaubara mounds, one can safely refer the two caskets to the Kushāṇa period. In the present state of our meagre studies of such minor pieces and antiquities, nothing as regards stylistic chronology and appreciation could be said.

Notes

[1] *JRAS.*, 1898, 572–588; *Sir Asutosh Mookerjee Silver Jubilee Volume*, III, 425-28; V. S. Agrawala, *Indian Art* (Varanasi), 1965, 82-3.

[2] A. Cunningham, *Bhilsa Topes* (London), 1854, p. 331; M. G. Dikshit, "Crystal Reliquaries in Madhya Pradesh", *J. of the Madhya Pradesh Itihas Parishad*, No. 1 (Bhopal), 1959, 53-7, pl. II.

[3] A. Rea, *South Indian Buddhist Antiquities* (A. S. I., New Imperial Series, Vol. XV, Madras), 1894, 11 ff., pls. I, IV.

[4] *ASI-AR.*, 1909-10, 32; *Indian Archaeology 1958-9–a review*, pl. II A.

[5] Subramaniam, *Buddhist Remains in Andhra* (Madras), 1932, 22-3, pl. facing 22; *Indian Archaeology—a review 1958-59*. A. H. Longhurst, *The Buddhist Antiquities of Nagarjunakonda* (Delhi, MASI. 54), 1938, pl. XIII c, d, XVI.

[6] M. N. Deshpande, "The Rock-cut Caves of Pitalkhora", *Ancient India*, No. 15, pl. LXII B.

[7] Bhagwanlal Indraji, "Sopara and Padama", *JBBRAS.*, 1881-82, 307; K. N., Dikshit, "Buddhist Relics from Sopara re-examined", *J. of the Gujarat Research Society*, I, No. 4 (=*Dr. Bhagwanlal Indraji Commemoration Volume*; Bambay), 1939, 1-5, pl. facing 2.

[8] Moti Chandra, "The Art of cutting hard-stone ware in ancient and modern India", *J. of the Gujrat Research Society*, I, No. 71-85.; M.G. Dikhit, *op. cit.*

[9] A. Cunningham, *Arch. Sur. Report, for 1871-72* (Calcutta), 1873, 16. As noted by him at that time it was in the possession of Mr. F. S. Growse. Any other detail and the present whereabouts of this casket are not known.

[10] A. Cunningham, *op. cit.*, 17, pl. II,

[12] J. Ph. Vogel, *Catalogue of the Archaeological Museum at Mathura* (Allahabad), 1910, 13.

[13] H. Lüders, *Mathurā Inscriptions* (Göttingen), 1961, 54-55.

[14] If the time of discovery of the two caskets as known from the above mentioned slip attached to them, is taken to be reliable, the person who discovered them was, however, not Growse as he was transferred from Mathura early in 1877.—See Vogel, *op. cit.*, 8.

[15] Rea, *op. cit.*, 11-12, pl. I (below extreme left); line drawing 7 on pl. IV (being reproduced here as Fig. 2).

[16] *IAR.*, *1957-58*, 11, pl. IX b.

[17] John Marshall, *Taxila* (Cambridge), 1951, I, 327, III, pl. 80 C; dated on the evidence of a Karoshthi inscription of Azes (with year 134=A. D. 77).

[18] *IAR.*, *1958-59*, pl. II A.

A Vaishṇava Sealing from Jhusi

by KIRAN KUMAR THAPLYAL

A fragmentary sealing (Pl. IV C) from Jhusi (25°29′ North Lat. and 81°55′ East Long., near Allahabad) in the Allahabad Museum [1] shows in the upper field, from left to right, a *śrīvatsa*, a *gadā*, a *śaṅkha* and a *chakra*. The portion to the left of *śrīvatsa* is broken and missing. The preserved part of the legend in Gupta characters reads,

1...*Lokaikanāthasya*
2...*dyādikarttuḥ*
3...*rtasvāmino.*

The symbols are typically Vaishṇava. Śrīvatsa adorns the chest of Vishṇu. The *gadā*, *śaṅkha* and *chakra* may be identified as Vishṇu's *Kaumudī gadā*, *Pāñchajanya śaṅkha* and *Sudarśana chakra* respectivaly.

Lokaikanātha ('the sole lord of the Universe') undoubtedly refers to Vishṇu in the *Vishṇusahasranāma* [2]. Quite likely, *sarva* preceded the preserved part of the first line of the legend, and as such it was *(Sarva)-Lokaikanāthasya* ('the sole lord of the whole Universe').

The second line refers to the God as the first performer (*ādikarttuḥ*) of something which was mentioned in that part of the sealing which is missing. The third line we restore as (*ā*) *rtasvāmino* ('lord of the distressed'). But there would have been a few more letters preceding to it.

Jhusi has yielded a large number of Vaishṇava sealings. More than four hundred clay sealings [3] bearing variously typical Vaishṇava symbols like *śaṅkha, chakra* and *śrīvatsa* and the legend *Pannalābha.* The legend has been taken to be the Prakrit form of the Sanskrit *Paṇyalābha* [4], but may be a mistake for *Punnalābha* (=Sanskrit *Puṇyalābha* i. e. 'acquiring merit'). Further, more than two dozen sealings in the Allahabad Museum, from the same site, variously bear the legend *Padmanābha, Padmanābhasvāmin* and *Śrī Padmanābha,* and Vaishṇava devices like *śaṅkha, chakra, śrīvatsa* and lotus, singly or in groups [5]. In passing, it may also be suggested that seal No.88 in Marshall's list of Bhita seals [6] bearing the device of a *chakra* and the legend *Padmanābha* would have been brought to that site as *prasāda* from a Vaishṇava temple at Jhusi.

The sealing under discussion also seems to have been a votive offering to some such Vaishṇava shrine. The cumulative evidence of these sealings shows that Jhusi was an important Vaishṇava centre.

Acknowledgement

For facilities of study and permision to take photograph grateful acknowledgement is made by the author to the authorities of the Allahabad Museum.

Notes

1. No. 374
2. See also B. Ch. Chhabra, in *Indian History Congress, Proceedings*, 1954, 123.
3. This information I owe to Dr. S. C. Kala, Director, Municipal Museum, Allahabad. A large number of these are now in the Allahabad Museum.
4. B. Ch. Chhabra, in *Lalita Kala,* no. 9, 13.
5. E. g. nos. 299, 300, 368, 371, 247, 352, 353, 410, 344, 252, 335, 393, 246 etc.
6. *ASI, AR,* 1911-12, no. 88, 58.

Two Earth-works from Gujarat

by R. N. MEHTA

Introduction

Parts of Gujarat are lying in rather low rain-fall region in India. With its average rainfall of about 30″ per year, it is but natural that in the years of scarcity of rain-fall its population would suffer from the acute shortage of potable water. Moreover the erratic nature of the monsoon rain would lead to crop failure for want of a shower or two as could be experienced often.

In such a precarious condition, people in this region would be forced to take necessary precautions for conservation of the meagre fresh-water supplies. This is done by either tapping underground water through wells and step-wells or *Kuṇḍas* or by collecting rain water in small individual cisterns or large tanks or ponds. This activity must have left many traces of earth-works of different periods, as could be seen by the remains of large earth-works that were studied by the present writer in the Sabarkantha district and at Junagarh [1], Ghumali [2] and other sites.

The present work deals with two large earth-works. One of them is out of use due to breakage and the other is still in use.

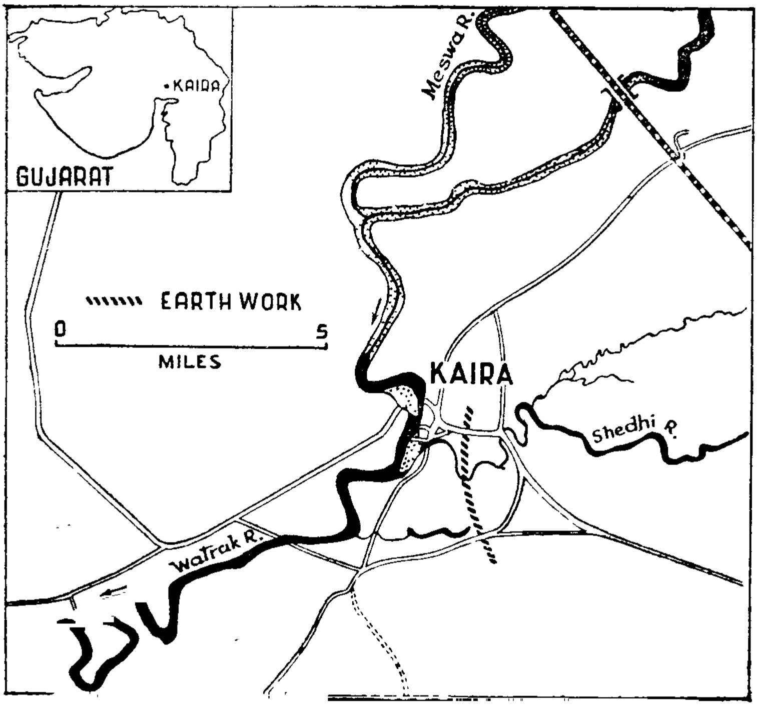


Fig. 1.

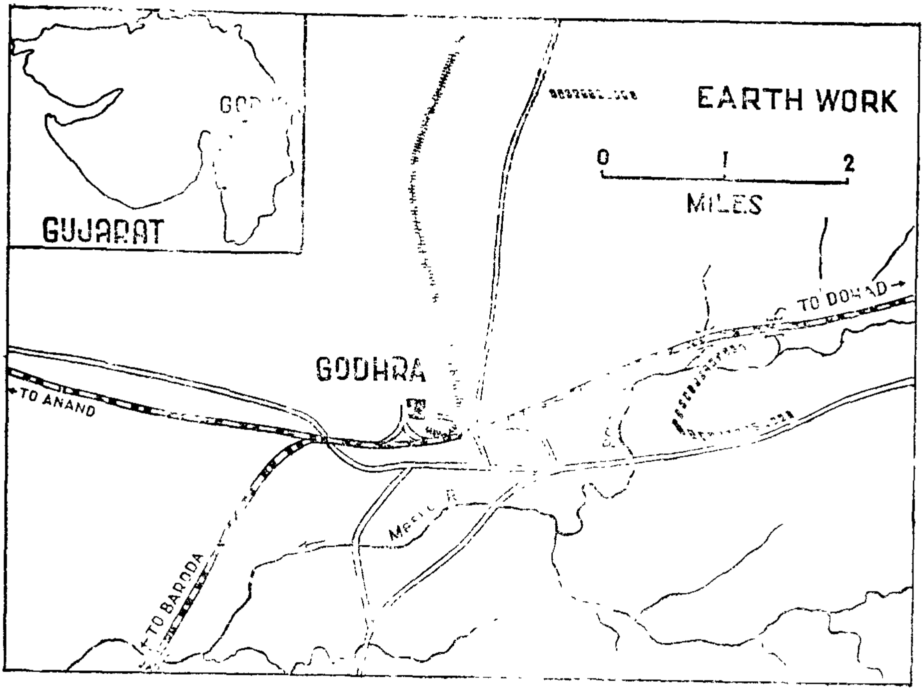


Fig. 2

Description of the Earth-work at Kaira

The first earth work (Fig. 1) that is described here exists near Kaira, ancient Khetaka, the headquarter of Khetaka Mandala.

To the south-east of Kaira, there is an earth work on which a Siva temple known as 'Paliya deva' exists. This is an 18 th century temple, but here a few Śiva liṅgas indicate that they are probably lower parts of rotary querns, which had their central axle also of the same material. Such an object was ideally suitable as a Śiva liṅga with its seat. This phenomenon was seen by the present writer at Gop and other sites, indicating the use of an older object in a new context.

The earth work on which this temple exists runs in a general north-south direction. It is cut by the national high way No. 8 running between Baroda and Ahmedabad. The earth-work runs in the south, towards the river Shedhi. It is washed away near this river but it continues on the south of the river Shedhi and runs for about a mile and a half before it disappears completely in the area under the jurisdiction of Vadsar village.

The earth-work is constructed of the yellow *Kankari* earth (Fig. 1). In a few cuttings some patches of black earth are also seen, indicating that the workers used the available material. The earth work is about 30 metres broad, 7 metres high at many places and at the top it is about 3 metres broad. This rhomboidal section of the earth-work and the arrangement of earth in the sections indicate that it is an artificial construction.

Today it is broken at some points, and is overgrown in many places by trees like *Babul*, *Neem*, *Sami*, *Piludi* etc. Many of them are large trees, which might be considerably old.

Chronology

At Kaira the tradition of this earth-work does not exist. People know this earth-work, but they do not throw any light on its history. This being the case, only archaeological evidence is adduced for chronology.

The evidence of 'Paliya-deva' indicates that the earth-work is earlier than the 18th century A. D., but a closer inspection of the bricks revealed some fragments with the breadth of about 10. 5" and thickness of 2.5".

A little to the west of this earth-work, a Śiva temple of mediaeval period exists. Here bricks of about $15'' \times 9'' \times 2.5''$ were seen. They indicated the presence of some structure of the bricks of this size. The absence of tradition for the existence of this earth-work and the large size of bricks that are found on the earth-work indicate that it might have been made at least before the mediaeval period, possibly during the time when bricks of the size that are seen here were in general use. The evidence therefore seems to indicate that this earth-work is more than a thousand years old. It was possibly constructed during the period of the Maitrakas and Rāshtrakūṭas when Khetaka was a place of importance

Purpose of the Earth-Work

The geographical position of this earth-work indicates that it might have been used as a dam to stop the flow of Shedhi and convert the area east of the dam into an artificial lake. Such earth-works of shallow streams are quite well-known in Gujarat as could be noted by the study of these in Sabarkantha [3], Girnar [4], Ghumali [5], and other sites, as well as the existing bunds at Godhra [6], Champaner [7] and other sites.

Description of Earth-work at Godhra (Fig. 2)

If the earth-work at Kaira is lying unused that at Godhra, that is noted here, is in use. It is the earth-work known as Kaneval. It is a long earth-work with partial use of stones and bricks. Its broader parts are 29 metres at the base, its height is about 5.5 metres and the breadth at the top is about 6.00 metres. The whole earth work is about 3 km.long.

This earth-work is in the form of a large semi-circle and hence seems to confirm the definition of a Sara as given in the Aparajita-priccha [8].

Chronology

A pumping station stands on a ruined temple belonging to the Chalukva period. Its lower plinth with parts of Bhita and Kalaśa are existing. It indicates that it was large and must have been destroyed at a fairly early date. After this, it seems that the general level of the earth-work was raised and over it another temple was built. Its foundation and parts of the stone structures are existing, but the upper structure has fallen down. This is a simple temple, probably of about 13th/15th century A. D.

These two evidences could easily indicate that this earth-work must belong to the Chālukayan period, but the average brick size of $15'' \times 9'' \times 2\frac{1}{2}''$ indicates that it might pre-date the Chalukyan period. But further evidence is necessary to take it to this earlier date.

This earth-work is still in use and hence it gives an excellent idea about the use of the earth-works, that were thrown across streams and built water reservoirs. Such a system was widely prevalent in Gujarat at least from 1st millennium B. C. and continued for a very long time. At present also this system seems to be under effective operation in certain parts of the country.

Notes

[1] R. N. Mehta, 'Sudarsana Lake', *Journal of the Oriental Institute*, **XVIII**, Nos. 1 & 2, 21 ff.

[2] R. N. Mehta & Priyabala Shah, 'Saurastra Na Ketalak Praeina Sthavs' (Guj.) *Vak*, 1. 56.

[3] R. N. , Mehta, 'Ancient Bunds in Sabarkantha District,' *Journal of the Oriental Institute*, **XII**, No. 4, 352 ff.

[4] R. N. Mehta, *op. cit.*

[5] R. N. Mehta & Priyabala Shah *op. cit.*

[6] Kaneval at Godhra.

[7] Vadatalav and Sukra talav at Champaner.

[8] Aparajitaprechi, 74, 34.

Early Historic Fortifications in the Ganga valley

by MADHUKAR SHRIPAD MATE

Like so much else in the life of ancient India, the art of fortification was nurtured in its infancy by the Ganga valley. This remark necessarily excludes the achievements of the Harappans in this direction. The chronological and cultural void is great and if the various peoples and cultures that succeeded the Harappans knew or remembered anything of the massive ramparts and walls of such cities as Harappa or Mohenjodaro or Kalibangan, they did not leave behind them any material evidence of such knowledge. It would, therefore, be quite justifiable to describe the activity in this field during the latter three-quarters of the first millennium B. C. in the Ganga valley as a rebirth of military architecture on the continent. It is intended here to reexamine the remains of some nine sites in the Ganga valley and its periphery (Fig. 1) with a view to understand the growth and evolution of the art of fortification in ancient India.

Such an investigation shows that fortifications as a device of military utility came into being in this region not earlier than the fifth century B. C. It further shows that scholars have somehow shunned from the idea of making a distinction between an embankment and a rampart, thereby confusing the history of military architecture. The only noteworthy exception is that of Rajghat. The excavators of this site have after detailed investigations arrived at the conclusion that the mud-ramparts they had found and had once considered to be defensive works were in fact embankments meant to resist floods. And they have clearly said so. It would be practically impossible for anybody to escape the similarity in the materials and methods used at Rajghat on the one hand and those of Kausambi and Ujjain on the other. It seems fairly clear that Kausambi and Ujjain had embankments to begin with and only at a later date they were turned to military purposes with necessary modifications.

These conclusions are based mainly on three factors that have not received their due attention in earlier discussions. First and foremost is topography, the ups and downs and the folds of the land where the site existed. Next comes a comparison of various aspects present at the particular site and various features that should be or should not be there if it were to be a fortification. In other words, considerations from the military angle have to be taken into account. Thirdly, sculptural and pictorial representations and descriptions from technical or semi-technical treatises can hardly be ignored. These have to be compared with each other and then with the ruins at these various places.

The study begins with detailed descriptions of the ramparts or fortifications as reported by the explorers and excavators. The sites examined are : Ujjain, Kausambi, Rajghat, Rajgir, Pataliputra, Ahichchhatra, Sravasti, New Rajgir and Vaisali in that order.

Ujjain (Madhya Pradesh) is situated on the eastern bank of the river Sipra[1]. A mud rampart erected here in Period I (c. 700 B.

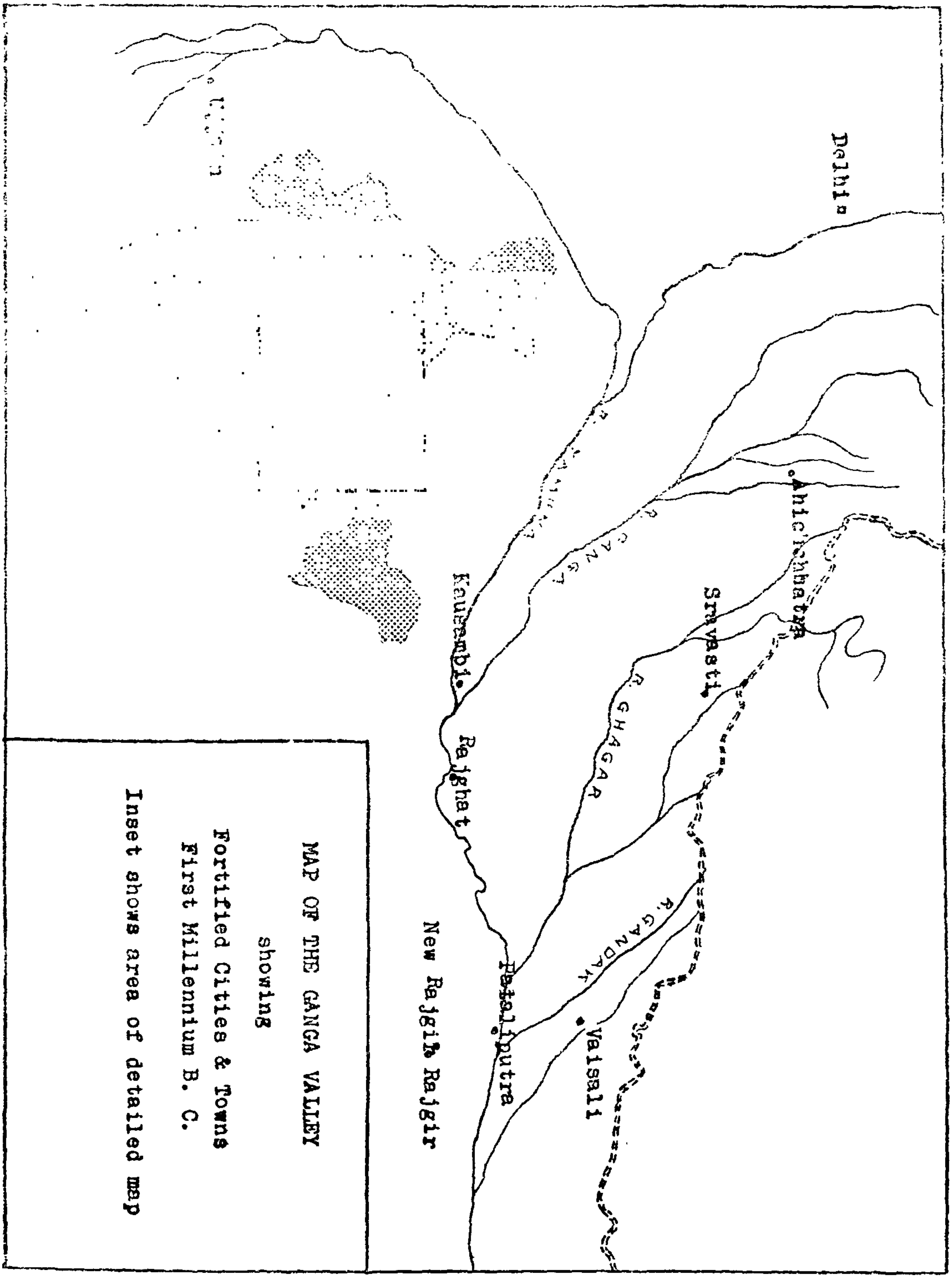


Figure 1 Map of the Ganga Valley.

C. to 500 B. C.) enclosed a polygonal area (Fig. 2). It was built by dumping the dug up yellow and black clays (from the moat) to form a thick wall with a gentle slope on the inner side and a less pronounced one on the other. This rampart had a basal width of bet-

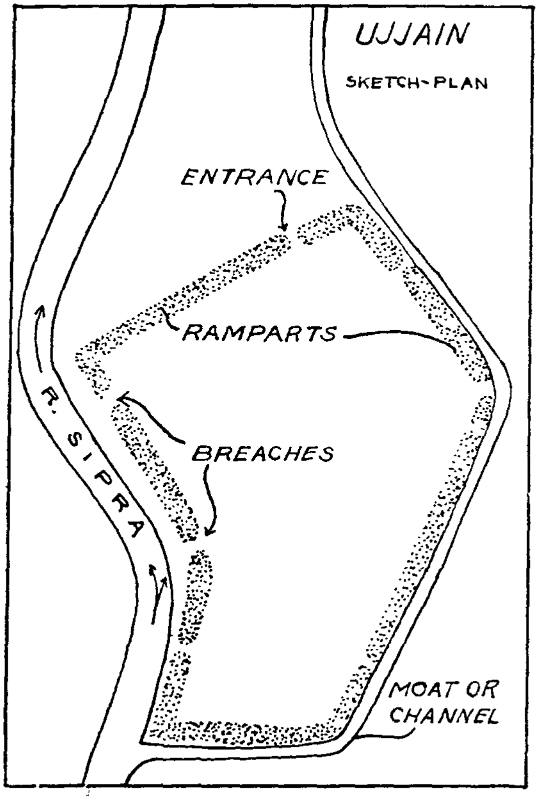


Figure 2 Ujjain : plan of ramparts.

ween 60 m. to 75 m. and its extant height is about 12 m. Immediately outside it and covering its southern and eastern sides was a moat between 23. 70 m. and 45 m. broad with a minimum depth of 6.50 m. To repair the damages to the rampart caused by the river floods, earthen fillings were given and then rivetted with burnt brick. The ramparts were also advanced riverwards and in so doing care was taken to reinforce them with stout timber logs.

This measure was visible for a length of 114 m. corresponding to the inward bend of the river. In this area the basal width of the rampart is as much as 105 m. In this same area the moat was lined by a brick wall to a depth of 8.10 m. The lining was on the side immediate to the mound. According to the excavator, during the succeeding three hundred years (c. 200 B. C. to 100 A. D.) the rampart continued to guard the city but fell in disuse after that. The major entrance to the city was through the north-western wall, the road was made of clay and pebbles and had to be resurfaced often.

Kausambi (District Allahabad) has been under excavation for over a decade now[2]. Information published on the remains at this site is available in plenty. However, it is piecemeal and no cogent picture emerges from it. This is mainly due to the failure on the part of the excavator to publish a comprehensive plan of the site indicating the mud-walls and ramparts, as has been most advisedly done in the case of Ujjain. Even the definitive report suffers from this lack. To a certain extent, Cunningham's sketch map[3] as well as the Survey of India sheets of the relevant area do step in to fill up this lacuna. (Fig. 3). The picture that can be made out of the mass of published details would be somewhat as follows.

Traces of the ancient habitation cover an area about eight square miles, a part of which was defended by a complex system of fortification. The mounds of the ancient rampart with the surrounding moat, form a semi-circle with the Yamuna as its base. The circuit of the ramparts is approximately six and a half km. The average height of the ramparts is 10.50 m. to 12.20 m but nowhere is mention

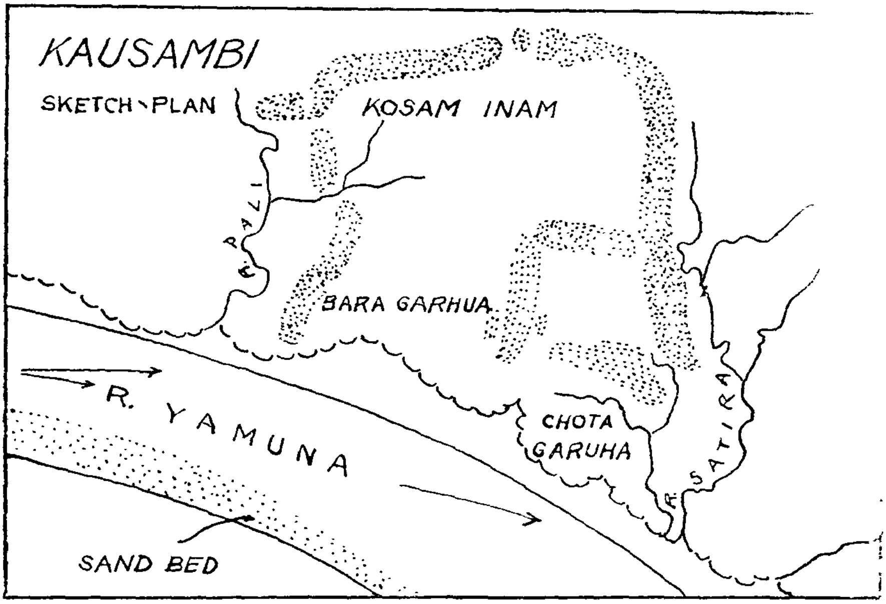


Figure 3 Kausambi : plan of the site and ramparts.

made of its basal width. Cunningham[4] also has expressed his inability to do it. Free standing towers measure from 21 m. to 22.70 m. in height. There are eleven gateways, five of which were principal ones, two in the east, two in the north and one in the west[5]. The moat surrounding the walls is supposed to be a later addition and has a width of from 120 m. to 300 m. at places. Except the construction of the towers, all the digging and building activity is assigned to Period I–originally dated 1,100 B.C., since revised to c. 8th-7th centuries B.C. The most striking feature, a brick revetment of 140 courses with a batter of 15 and 40 degrees given to the rampart is also ascribed to the same period.

In the subsequent periods subsidiary ramparts with basal widths of 9 m. to 5.20 m. were constructed. Their height was around 4.50 m. Brick towers were also erected over the earthen ones during this period. One such tower measured 11.40 m. x 5.20 m. and had projecting platforms on either sides with guard-rooms on the remaining two sides. A circular or curved brick wall and a corbelled drain have also been placed in this phase and although it has been hinted that they were in some way connected with the defences, no evidence to that effect has been offered. Excavations during 1962 are reported to have revealed a rather interesting feature : "The rampart on the southern side was found to have been made of mud. This wall evidently served a dual purpose viz. to defend the city in case of attack and save it from the floods of the Yamuna. The period of its construction and its subsequent history could not, however, be determined"[6]. Unless the factors that led to such a conclusion are revealed, justice cannot be done to the entire Kausambi data, for it speaks in two voices.

The remains of Rajghat (Dist. Varanasi) are spread over a triangular area between the rivers Ganga and Varuna (Fig, 4). The

rampart was presumably built on natural soil and the extant height is 10 m. Remains of a platform in the form of stout timber logs and beams have been found near the toe of the rampart to a length of 34 m. Several deposits of sand and silt have been uncovered during the excavations. Here also no general plan has been published, nor details of the

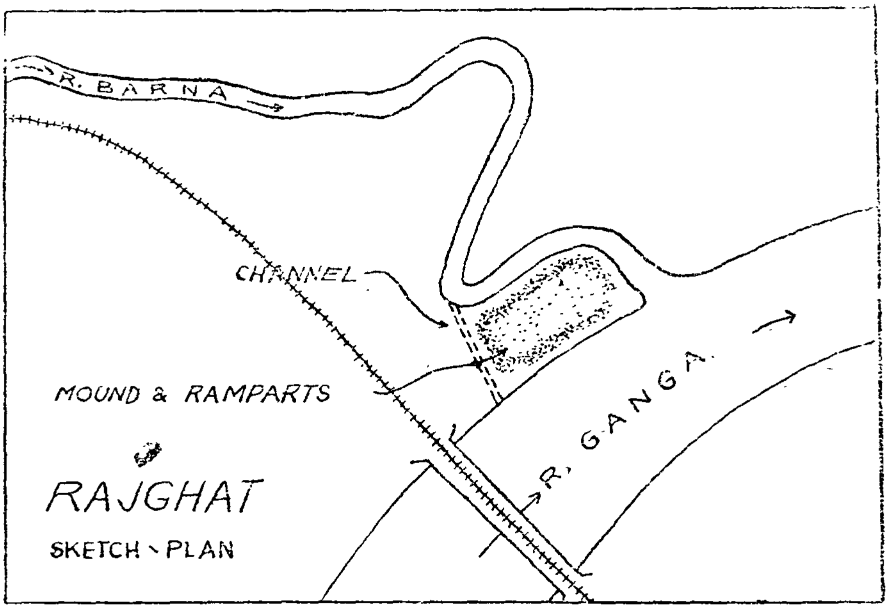


Figure 4 Rajghat : the site.

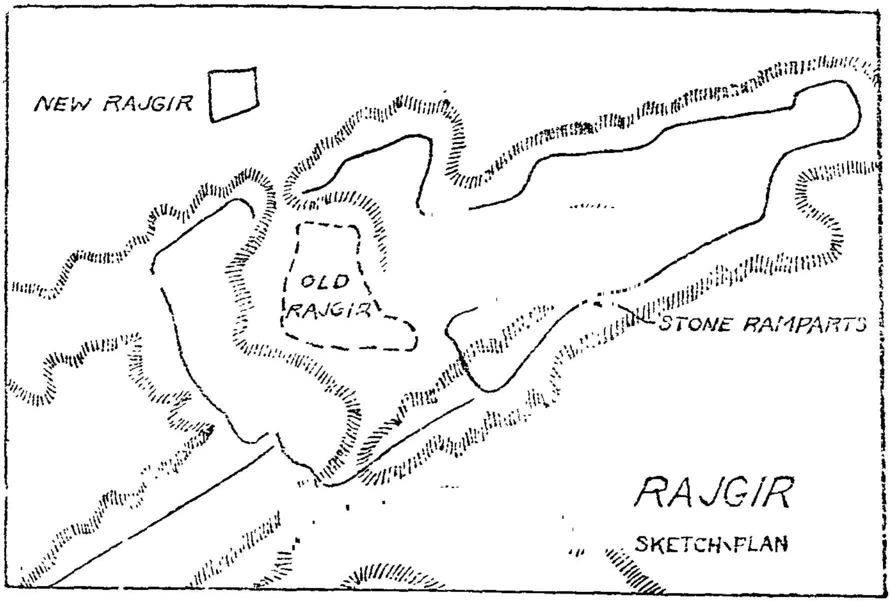


Figure 5 Rajgir and New Rajgir : plan.

basal width of the mud-rampart given. However, as stated earlier, the excavators have clarified the situation as under, "It was at this stage that a massive clay embankment was built as a defensive measure against the regular floods of the Ganga. Being merely a defensive measure against floods, it was not planned to be a regular fortification or rampart, a fact which is corroborated by three more cuttings laid in the same alignment"[7].

Rajgir (Dist. Patna, Bihar) was the capital of ancient Magadha or southern Bihar and is situated on the northern fringes of the Barbara hill ranges. The town itself is situated in a valley surrounded on all sides by hills. These hills provide an excellent natural fortification and shield it off from the plains of the north (Fig. 5)[8]. At a very early date in the life of the city the natural defences were substantially reinforced by a fortification consisting of a high rubble wall, generally 4 m. in thickness. It runs at the top of all the hills and has a circuit of about 40 km. The natural gaps between the hills were used as gates in the fortification. Inside this valley were other defensive walls built in different periods, the chief of which was the inner defensive wall, generally built of heaped up earth with pebble core and enclosing a pentagonal area with a perimeter of 8 km.

Pataliputra, modern Patna, the capital of Bihar, is situated on the confluence of the Son and the Ganga. It occupied a roughly triangular area of very narrow width (length 15 km. and breadth 2.5 km). The present city is located practically on the debris of the ancient settlement and large-scale excavations have not been possible. At a number of places structural remains have, however, been uncovered. "At Bulandibagh again, below some brick buildings of Gupta date, was found a unique wooden construction consisting of a series of 4.20 m. long wooden planks at the bottom, flanked by 4.50 m. high wooden uprights which were spanned on the top by tennoned planks, the entire arrangement making a hollow passage. This structure was uncovered to a length of 75 m. without reaching its end. It was identified as the wooden palisade mentioned by Megasthenes"[9]. A similar wooden structure, without, however, the bottom planks also came to light accidentally at Gosain-Khanda about three quarters of a kilometre from Bulandibagh. Megasthenes, the ambassador of Seleukos Nikator to the court of Chandragupta Maurya has left the following account. "It is in the shape of a parallelogram and is girdled with a wooden wall, pierced with loop-holes for the discharge of arrows. It has a ditch in front for defence for receiving the sewage of the city .... The ditch was 181 m. in breadth and 20 m. in depth... The wall had 570 towers and had sixty-four gates" [10]. How the timber structures found in the excavations and the descriptions of Megasthenes fit in with each other is to be seen slightly later on.

Ahichchhatra (Dist. Bareilly, U. P.) is presently enclosed by a fort wall with circular bastions 34 in number. This wall and the bastions are not more than three hundred years old, being built by Mughal officers of the region [11]. The circuit of these walls is 4 800 km. The shape of the area is roughly triangular (western side 915 m. northern 1.3 km. south-eastern 1.600 km) The place is situated between the rivers Ramaganga and Gangham which make access extremely difficult. On the eastern side is the Piriya Nala or Pairiya

... steep banks and numerous ... water. The remains of the ... below this late medieval ... are described as under.

... a mud-rampart around it ... Kushana period. In the second ... considerably damaged and was ... forced at the vertex by the constru... of a brick-wall 4.98 m. broad and ... 9 m. ... running throughout its length. (Earlier students had perceived two earlier ramparts in mud, over which, by the first century B. C., a brick wall was erected. But these observations now stand corrected as above.) "To economise the use of brick, rectangular gaps measuring 2.13 x 1.32 m. were left in the brick wall at regular intervals, and the openings filled with rubble and clay."[12] In the third phase the brick wall was given the protection of a mud cover as its first line of defence. It was buttressed in the fourth phase by another mud-packing. A partition wall has also been referred to in

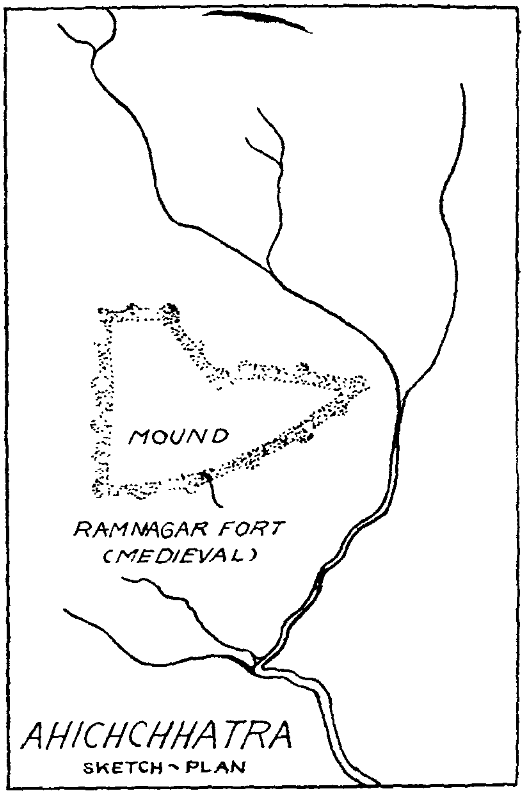


Figure 7 Ahichchhatra : general plan of the site.

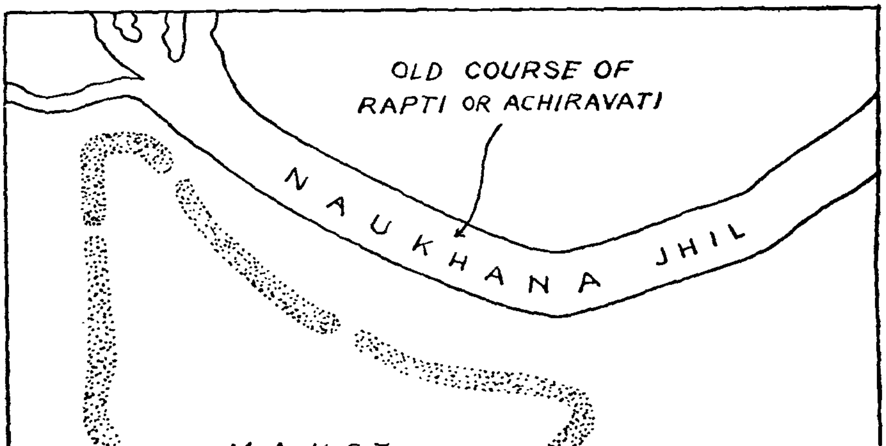


Figure 6 Sravasti : plan of the ramparts.

this connection, and it has been suggested that it divided the fortified area in two and the less secure portion was deserted (Fig. 6).

Sravasti (Dist. Bahraich, U. P.) is today represented by Mahet in the Baharaich and the Gonda districts of the U. P. [13]. It is on the southern bank of a sheet of water known as Naukhan Jhil which is a crescent-shaped inland lake. Cunningham, however, states specifically that it is the old course of the river Rapti, also known as Achiravati, which today flows about 2 km. north of the mound of Mahet[14]. The habitation at this place extended from the eighth cent. B. C. to fifty B. C. The area was girdled with a mud-wall about five km. in circuit by about 250 B. C. Its basal width is 29 m. and the extant height is 3.50 m. On its top, a brick structure 'serving probably as a parapet over the rampart' was erected. A mud filling was soon put over this and again a brick structure erected. All this activity is assigned to the period of 250 B. C. to 50 B. C. i.e. the Sunga and Kushana times (Fig. 7).

New Rajgir (Dist. Patna, Bihar) is a small fortified area outside the valley of Rajgir. The defence wall was hitherto believed to have been built of rubble. The excavations revealed a mud-rampart with a basal width of 40.33 m. except on the north where it is less by three metres, built over the remains of an N. B. P. habitation presumably destroyed by fire. Its extant height is 7.31 m. and on the southern side there was a brick-built retaining wall 2.13 m. in height, 1.21 m. wide at the top and with a batter. Outside it was a moat, the exact dimensions of which could be not ascertained. All this belonged to Period II A. A brick wall was added on the top (width of this wall is not mentioned)[15]. Over the collapsed debris of this wall a 2.13 m. thick deposit of earth and ash was laid in Period III A. Above this layer a wall of brick-bats was erected during Period III B. Its width was 3.35. m. Although the excavators do not offer precise dates, they suggest the sixth-fifth centuries B. C. as approximate dates for Period II, i. e. the beginning of the rampart. As to the rubble rampart suspected by previous investigators, it could not be traced in the area excavated.

Vaisali is today represented by Basarh in the Muzaffarpur district of Bihar (Fig. 8). The site was excavated several times. The work done during 1958-59 has revealed information highly valuable to the study of fortifications[16]. During Period I (Sunga, early second century B. C.) a wall of burnt bricks, perhaps 6 m. in thickness, was erected. In Period II i. e. the late second century B. C. a massive earthen rampart was superimposed on it. This had a basal width of 21 m. the extant top width was 6.30 m. and the extant height was 3.80 m. The digging of earth for this rampart naturally left around it a moat. During the late Kushana or early Gupta period (Period III) a burnt brick wall 2.70 m. in width was built on top of this earthen rampart.

Topography of each of these sites may now be examined in some detail. Ujjain is on the eastern bank of the Sipra river. The river has a typical 'S' shaped bend here and flowing south to north as it does; if in spate it would burst right in the heart of the city. Especially the banks opposite the point where the course turns northwest at a sharp angle would be vulnerable to the pressure of mounting waters. Just before the S bend begins, a moat has been dug towards the east. Running about 700 m. due east it turns towards the

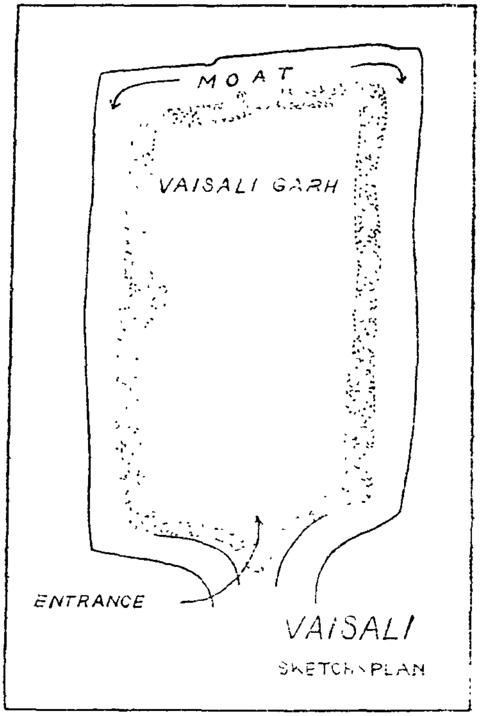


FIG 8

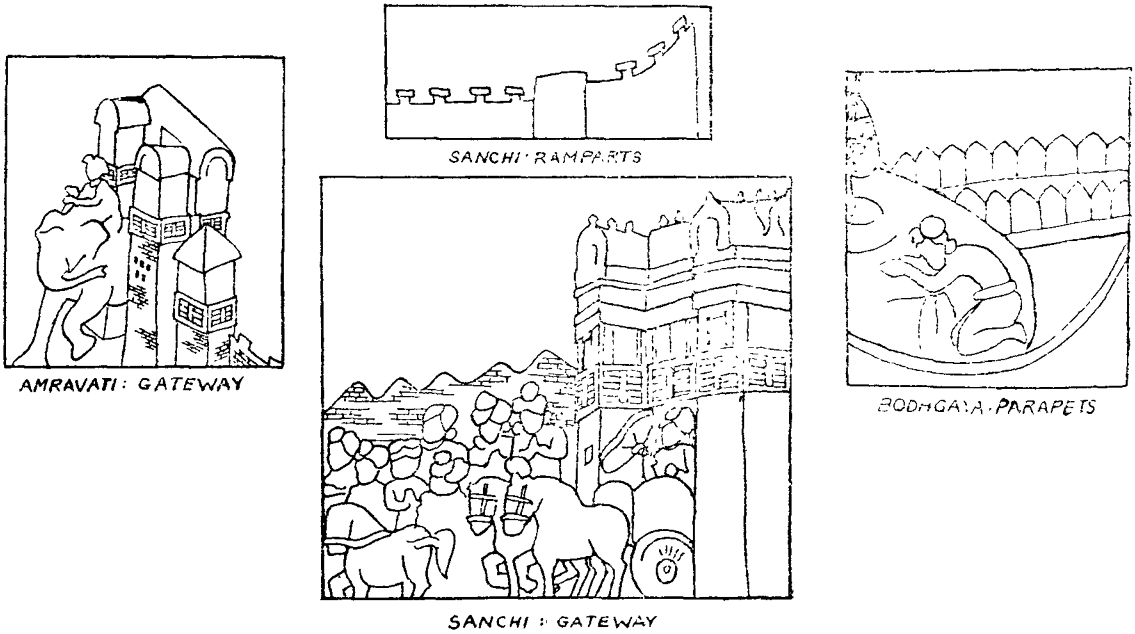


FIG. 9

Figure 8. Vaisali : plan of Vaisali Garh. Figure 9. Sanchi : ramparts. Sanchi : gateway. Bodh Gaya : parapets. Amravati : gateway. All these are line drawings and sketches made from plans and photographs published in works cited in the references. They do not have any scale.

north-east. After going in that direction for a distance of 900 m. it changes direction again to flow north-westwards and then eventually meets the river. The width and depth of the moat leave little doubt that it was intended as a diversion channel to carry off excess water during floods thus considerably reducing the force of the main stream of the Sipra before it reached Ujjain. That it did often enter the city is shown by the wide breaches seen in the western side of the rampart. It was at these various points and the south-western tip that brick revetments and timber reinforcements were found. Many of the breaches as well as the moat were filled up (in antiquity) by erosional deposits. The location of the gate provides, if additional proof were required, a certain indication. It is located in the northern wall in the north-eastern corner. It opens on a patch of ground which is comparatively away from the river and her floods.

Next to be reviewed is the position of Kausambi. It has been identified with the area presently embracing Kosam Inam, Garhua-Barha and Garhua Chota. On the western side of this area the river Pali and its tributary streamlets form deep channels. On the eastern side the river Satira and its tributary streams form equally deep channels. Towards the north no such natural gulley entirely covering this piece of land is visible, but the tributaries of Pali and Satira close in on each other and leave only a small belt free of water. The Yamuna here flows in a south-easterly direction. The southern bank is gradually sloping and huge sand-beds lie immediately close to it. Water could spread over here effortlessly. The northern bank s steep and takes the full force of the onrushing waters. The numerous gullies seen on this side are beds of streams running towards the the river under normal conditions. However, during conditions of heavy flooding, water of the river enters them to flood the whole area turning the Pali and the Satira into dangerous neighbours. The thick burnt-brick revetment, the constant advancement of the ramparts in this area and mud-rampart on the southern side of the town would indicate this to be the case.

At Rajghat the excavators have clearly stated that the mud-ramparts discoverd at that place were embankment to resist the encroachment of flood waters. For a place like Rajghat that would be subject to flooding from two directions, the north and the south, a massive embankment along with moats and diversion channels was the only protection. Although the northern portion of this site has not been subjected to thorough excavations, a moat has been traced.

Pataliputra did not possibly fair as well as the three sites mentioned above. Its position is definitely precarious. Floods must have been a constant source of danger. The excavated ruins in the form of timber verticals and beams across them were most probably the inner core of a huge earthen rampart. They might have or might not have formed an enclosed passage within the rampart but they certainly served as reinforcements. It is most likely that on top of this earthen rampart timber parapets and wall of which Megasthenes speaks were erected. These parapets would shield the archers posted to defend the city. This is the only explanation that would account for all the known facts of topography, of archaeology and of history. Pataliputra could thus very well be treated as the first

(known) step towards the transformation of flood embankments into military structures.

Sravasti might represent a similar phenomenon. Its proximity to the river Rapti and the curved course of that river would have exposed the town to periodic floods. And hence the first wall might have become necessary. The basal width of 29 m. makes it appear as if it was intended to avert floods; human beings could be and were excluded with much thinner walls. The brick parapet wall above this embankment might be a later addition or if the two were contemporary, Sravasti walls should be treated as double purpose walls. If, however, the Rapti had already started changing its course by the time Sravasti started flourishing such an embankment would be unnecessary.

Ahichchhatra, New Rajgir and Vaisali do not face this problem. The rivers flowing past them are at a very safe distance and even in spates would not encroach upon any of these sites. There is no need in their case of any flood protection measures.

It has been shown above that the massive mudwalls reinforced by timber and externally revetted with burnt brick could be interpreted as embankments meant to resist floods at least in the case of half the number of sites considered. Their substantial sizes involve tremendous labour and utilization of men and material on a truely vast scale. Such an effort would be undertaken by any society only if it is faced with a problem of such immense magnitude. An invading army need not have a rampart of 75 m. basal width or a succession of subsidiary ramparts as wide when put together. The same is true of the so-called moats with widths of 30 m. and above and reaching to 300 m. in the case of Kausambi at one place. These would be more appropriately called diversion channels. The brick-revetments with the particular angle of batter as at Kausambi would be an invitation to an invading army, they could be easily scaled in a mass sortie. But floods would be prevented from eroding the embankment by these revetments. Again, Ujjain, Kausambi or Rajghat have no traces of any parapets above the ramparts. They are a cardinal military requirement, in their absence, it would be merely shifting the battle-ground from a plain to a mound. That element provided by the mason which stands between the assualt party and the defenders, which shields the latter while enabling them to throw missiles on the former, viz. the parapets, is totally absent in all these three sites. Militarily they are next to useless.

In contrast, the later towns have mud-walls of much smaller dimensions and have, as a rule, brick or timber as at Pataliputra parapets over them. By the third century B. C. it had become axomatic that there must be such a parapet. The *Arthaśāstra*[17] most faithfully records this practice when it says :

"At a distance of four *daṇḍas* from the moat, he should cause a rampart to be made out of the earth dug out, six *daṇḍas* high, made compact..."and" on top of the rampart he should cause a parapet to be built, double the breadth in height, built of bricks... with the top decked with drums or monkey heads"

It would become clear that the brick wall on top of the Ahichchhatra rampart is not, as the excavators have made out, a later addition, but is a part and parcel of the earliest fortification. It runs all along the

rampart and if it could have been found intact, there is little doubt it would have shown the monkey-heads or *kapi-śirṣas* of the parapets. From available archaeological data it would appear that ruins from Ahichchhatra could be treated as the earliest remains of a military fortification from the Ganga valley and that it was followed close on its heels by New Rajgir and Vaisali. Pataliputra and Rajgir might be contemporaries. As to the general aspect of these ancient fortifications representations on the sculptures at Bodhgaya, Sanchi and Amaravati[18], though slightly later in date, would be most illustrative. All of them (Fig. 9) show brick walls with parapets or *kapi-śirṣas* of various designs. And although nothing regarding the maots or the mud-ramparts could be deduced from them, they are of great value in another direction. None of the above excavations, tell anything about the gateways or entrance structures. These sculptures could step in and impart a good idea of the nature and appearance of gateways etc.

To sum up, from the examination of the excavated remains of nine of the most well-known sites of the Ganga valley, it seems that the earlier ones have embankments and diversion channels meant as flood protection devices whereas the ones that came into prominence during the fifth century B. C. and onwards had formidable fortification around them. And this conclusion has to be stated inspite of all literary evidence cited on this subject so far[19].

Notes

[1] *Indian Archaeology-A Review, (IAR),* 1955 to 58.

[2] G. R. Sharma, *The Excavation at Kausambi, 1957-59;* (Allahabad), 1960. 27-40. and *I A R,* 1960-61 to 64-65.

[3] A. Cunningham, *Archaeological Survey of India Reports,* Vol. 1, Pl. XLVIII.

[4] *Ibid.*

[5] Sharma, *op. cit.* [2].

[6] *I A R*—1962-63, 33.

[7] *I A R*—1957-58 and 1960-61 to 64-65; 1964-65, I-81.

[8] A. Ghosh, "Rajgir : 1950", *Ancient India,* No. 7, 66-78. and *I A R*—1956-57, 1958-59.

[9] Y. D. Sharma, "Exploration of Early Historical Sites", *Ancient India,* No. 9, 147.

[10] J. W. McCrindle, "*Ancient India as described by Megasthenes and Arrian,* (Calcutta), 1926, 65.

[11] Cunningham, *op. cit.,* 255-265. ; I A R—1963-64, 44.

[12] *I A R*—1963-64, 44.

[13] *I A R*—1957-58, 47-50.

[14] Cunningham, op. cit., 331.

[15] *I A R*—1961-62, 7-8.

[16] *I A R*-1957-58 to 61-62; 1958-59, 12 and K. Deva and V. Misra, *Vaisali Excavations, 1960.*

[17] R. P. Kangle, *Kautiliya Arthashastra,* Vol II, 71-72. (Bombay), 1963.

[18] Bodhgaya : L. Bachhofer, *Early Indian Sculpture,* 42.
Amaravati : *Ibid,* 123.
Sanchi : H. Zimmer, *Art of Indian Asia,* 2, Pls 9 & 18.

[19] S. D. Singh, *Ancient Indian Warfare with special reference to the Vedic Period;* (Leiden), 1965, 119-134.

A Middle Stone Age Site on River Durgawati in District Shahabad, Bihar

by BHUPENDRA PAL SINGH

In the last few years after independence archaeological activities in Bihar attracted a lot of attention of the scholarly world with the discovery of Stone Age tools and Historical material [1]. Ironically enough, these activities are confined mostly in the north-eastern and south-eastern parts of the province, leaving Shahabad district a *terra incognita*. Very little we know about the prehistory of the district, which incidently lies on the borders of one of the prehistorically richest regions of India i. e., Mirzapur. The Kaimur running through district Mirzapur extends eastward to the district Shahabad of Bihar, thus forming a physiographically distinct region in an identical geological frame work. Mirzapur had yielded rich evidence of more than one prehistoric cultures. Shahabad too, if explored exhuastively, is bound to provide the glimpses of the cultural milieu of Stone Age societies and also the extent of their nomadic wanderings in the eastern Kaimurs.

The present note records the first discovery of a few Middle Stone Age tools in the district, which were collected by the author near Malhipur in Sasaram sub-division along the left bank of river Durgawati. Besides, a rich Late Stone Age [2] industry near Gupteshwar and several Black-and-red and N. B P. yielding sites on both the sides of the river were also found [3].

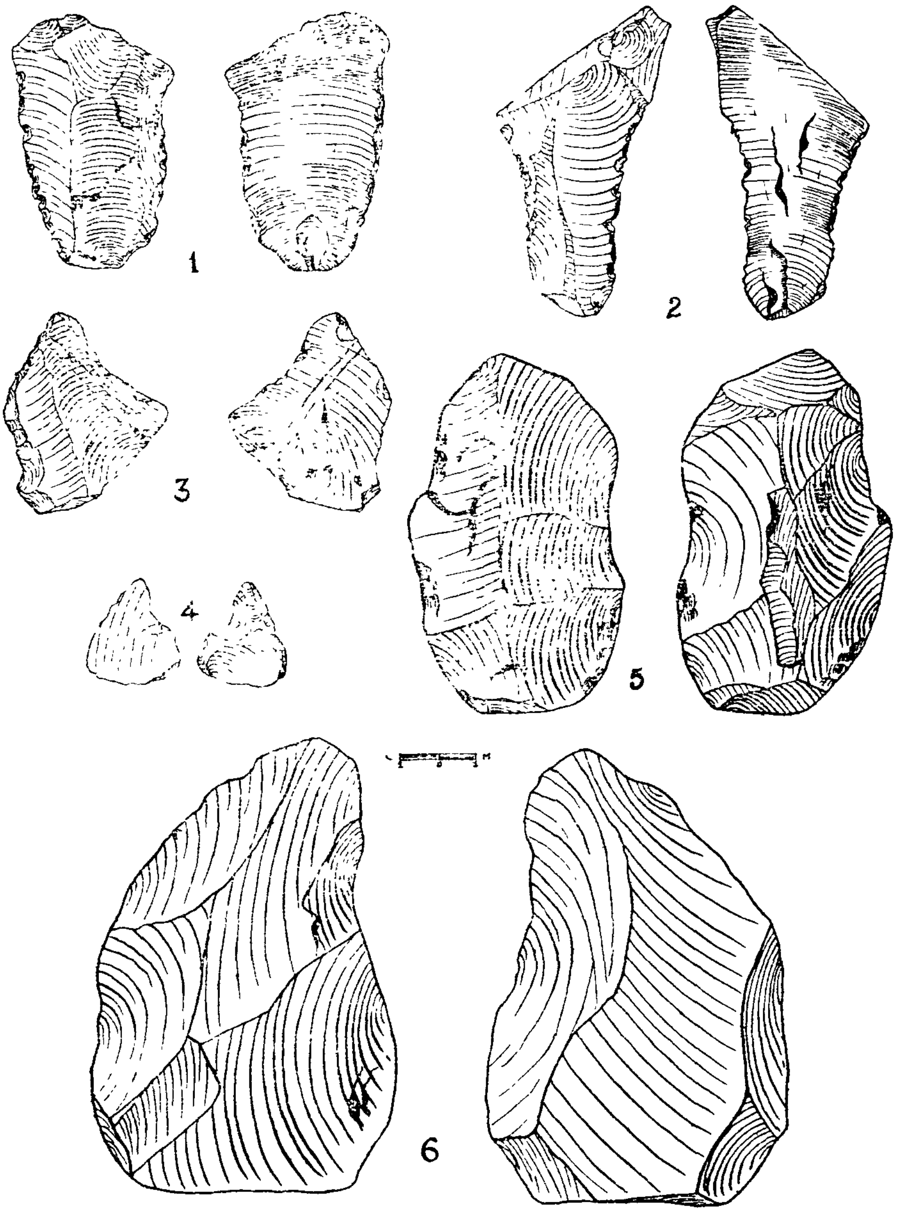
The river Durgawati rises at Bhakma on the southern ridge of the plateau. After passing through the vicinity of the Stalactite caves of the Gupteshwar and hill fortress of Shergarh, it enters the plains at Karamchat and flows towards Jahanabad and ultimately falls into the Karamnasa in the north-east after recieving the Kudra in the east. Malhipur is situated in the middle reaches. Here the river has been narrowed by the continuous deposit of sand, occasionally covered with gravels. The tools under study are found in these gravels.

Of the numerous stratigraphical sub-divisions constituting the Vindhyan System only three are conspicuous by their presence in the area, viz. Kaimur Sandstone, the Bijaigarh Shales and the Rohtas Limestone. Rohtas Limestone, which is exposed here, has a aggregate thickness of five feet, and supplies the silicious material [4]. It is these nodules which are picked up from the river bed and utilized in the fabrication of Middle and Late Stone Age tools in the valley. The famous stalactite caves of Gupteshwar are situated in this limestone belt.

As regards the stratigraphy, no section of definite antiquity is found exposed on the river banks. At places, a layer of gravel of varying thickness is seen embedded in the cliff. The probable sequence of deposit from top to bottom in the Durgawati, made out after much searching, seems to be as follows:

(1) Brownish red clay

(2) Gravel



(Fig 1) Middle Stone Age Tools from Shahabad.

(3) Silt
(4) Kankar.

All the tools are picked up from the gravel of the river bed and have not lost their original lustre and freshness, except two specimens in which some rolling is evident. The absence of definite stratigraphic sequence, so also the small number of the tools in the loose gravel support the chance of their transportation from some full fledged site which perhaps lies in the nearby hills. The raw material used for the tools is invariably silicious and mostly flint.

All the implements but one have been made on flakes and having a faceted platform. They have a soft diffused bulb of percussion, sometimes with a tiny flat bulbar scar, which attest the use of soft stone hammer. Mostly flakes of the collection exhibit Levallois tendency. One flake of the collection (Fig. 1) shows careful preparation of core before being detached It is a typical Levallois flake. One single specimen of thick quartzite flake was also found If the size and crudeness of technique are any criteria, the specimen should be assigned to the Early Stone Age. Typo-technologically, these tools appear to be in full agreement with the Middle Stone Age tools of Mirzapur [5]. The length of artifacts varies from 2.6. cms. to 8.2 cms.

The typo-technological description of the tools is as follows :

1. (Fig. 1,1) A side scraper on roughly sub-triangular flake of Levallois type, which has been flaked from its underside, and on the shorter end. The marks of the preparation of the core are present on both the ends. Both the lateral margins are partially retouched from the vertical surface. The retouch is short, although not very regular. Under surface is plain with a weak bulbar-scar. State of preservation is fresh. Dark flint.

2. Fig. 1,2 A thick blade with a narrow base and a broken soft bulb and broad head. It is interesting to note that the specimen contains striking platforms on both the ends–the upper one is plain but unprepared and the lower one is faceted. Marks of use are visible on both the edges. The cross-section is triangular. State of preservation-fresh. Brownish flint.

3. (Fig. 1,3) A rolled triangular flake, which, on the basis of the shape and preparation of striking platform may be compared with so-called pseudo-Levallois point. The edges show some dull and faint retouch marks at high angle. Dark grey flint.

4. (Fig. 1,4) A piece of a broken flake, with a notch formed as a result of fine retouch at a high angle. State of preservation-fresh. Dark black flint.

5. (Fig. 1,5) An elongated and rectangular core from which some large flakes have been removed haphazardly. State of preservation—rolled. Brownish-yellow opal.

6. (Fig. 1,6, Irregular flake of fine grained quartzite. Four big flakes have been removed from the upper surface, while three from the under surface. Slightly rolled. Typologically belongs to the Early Stone Age.

Notes

[1] B P. Sinha, Presidential address in the Seminar on Pottery at Patna, 1968.

[2] B. P. Singh, "A microlithic site from Shahabad (Bihar), *Purātattva*, Vol. I, 100-103, Pl. XII, 1967-68.

[3] B. P Singh, "Exploration in Shahabad (Bihar)", 14-50, 1968, unpublished Report—Copy in the Department of A. I. H. C. and Archaeology, B. H. U.

[4] E. Vredenberg, "Suggestion for the classification of the Vindhyan System" *Rec. Geol. Surv. Ind.*, Vol. 38, 255-60, 1906.

[5] B. P. Singh, "Stone Age Industries on Balia Nadi, Mirzapur". 80-84, 1962, unpublished M. A. thesis, copy in the Department of Anthropology, Lucknow University, Lucknow.

A Sealing from Sunet and Saiva Vaishnava Syncretism

by KIRAN KUMAR THAPLYAL

Sectarian jealousies and rivalries often prompted the followers of various sects to create pieces of visual arts to glorify their own deities and show their superiority over those of the others. Such tendencies were more prominent amongst the followers of Śaivism and Vaishṇavism within the Hindu fold, as demonstrated by such icon-types as Nṛi-siṁha and Śarabha [1]. Yet certain icon-types like Hari-Hara and Trimūrti clearly show that attempts were also made at rapprochement between the two. The present unpublished sealing from Sunet (District Ludhiana), now in the Indian Museum, Calcutta [2], belongs to the latter type (Pl.IV B).

The clay sealing is circular in shape and bears in the upper field a *triśūla* and a conventionalized *chakra* and, in the lower, a neatly executed legend *Śri-Dvipārshadasya* in Gupta characters.

The word *pārshada'* means an associate, companion or attendant especially of some god [3]. The legend *Dvipārshadasya* means '(seal) of one who has two *pārshadas*'. The two *pārshadas* in the present context undoubtedly refer to the *Triśūla* and *chakra*, the *āyudhas* of Śiva and Vishṇu respectively. It is only Hari-Hara–a form representing the ideal union of Vishnu and Śiva that can claim to have the *Triśūla* and the *chakra* as *pārshadas*. The sealing, in all probability, belonged to some temple enshrining Hari-Hara type of cult icon in its *sanctum sanctorum*.

Sunet, so well known for Yaudheya coin-moulds, has yielded a large number of seals and sealings and other antiquities, some of them unmistakably religious in character. Some sealings from that site in the Indian Museum, Calcutta, bear distinct Śaiva devices. One [4] has the lone symbol of *triśūla*, another [5] a *triśūla* and *nandī* while yet another [6] a *triśūla* and the legend *Rudraśarma* on the obverse, the reverse bearing the same symbol with the legend *Jajjasya*. Still another [7] has a *triśūla-paraśu* and a vase.

We have also Vaishṇava sealings from this site. One in the Indian Museum, Calcutta [8] has a *śaṅkha* on pedestal and the legend *Śrīdevasya* in Gupta characters. Typically Vaishṇavite is the sealing from this site bearing the legend *Śrī jitaṁ bhagavatā svāmi Nārāyanena* [9] (victory has been achieved by the Lord Nārāyaṇa) which compares favourably with such other Vaishṇava legends as *jitaṁ bhagavatā* [10], *jitaṁ bhagavatā Vāsudevena* [11] and *jitaṃ bhagavatā gata-ghana gaganābhena* [12] occuring on seals and in epigraphs. The evidence thus suggests the co-existence of Śaiva and Vaishṇava cults.

Our sealing is not the lone example testifying to the combined form of Vishṇu and Śiva (Hari-Hara). We may refer to a clay sealing from this very site and in the Indian Museum, Calcutta [13], bearing a *triśūla* and the legend *Mātriśarma* in Gupta characters on one side and the device of a *chakra* on the other. Still

morespecific in this context are a good number of sealings hailing from this site and bearing the legend *Śaṅkara-Nārāyaṇābhyāṁ* '(Salutations to Śaṅkara and Nārāyaṇa) in Gupta characters. These [14] do not bear string-marks and instead contain either finger-impressions or the name of some individual (devotee) and were, therefore, votive-offerings to some shrine dedicated to Śaṁkara and Nārāyaṇa or tokens offered as *prasāda* by the priests of such a shrine. The above cited evidence clearly contradicts the assertion of J. Agrawal that Sunet had no devotional traditions [15].

The sealing under discussion probably also belonged to the same temple as those with the legend *Śaṅkara-Nārāyaṇābhyāṁ* and one bearing Śaiva and Vaishṇava devices on its two sides, referred to above. Syncretistic icons are met with from the Kushāṇa period onwards [16] and the religious catholicity of the Imperial Guptas, during whose rule the present sealing was manufactured, no doubt, added greater fillip to the creation of such images.

ACKNOWLEDGEMENT

The author is grateful to the authorities of the Indian Museum, Calcutta, for facilities of study and photograph of the seal.

Notes

[1] Vishṇu in the form of Nṛisiṁha killed Hiraṇyakaśipu, the devotee of Śiva (and thus protected his own devotee Prahlāda).

[ ] Indian Museum, No. 4624-A12823.

[3] See Monier Williams, *Sanskrit English Dictionery*, *S. V*

[4] Indian Museum, No. 4692-A 12871.

[5] Indian Museum, No. 4699-12878

[6] Indian Museum, No. 4680 - 12864.

[7] Indian Museum, No. 4695-A 12874.

[8] Indian Museum, No. 4677-12862.

[9] G. B. Sharma, 'Sealings from Sanghol and Sunet', *JNSI*, XXX, 220-22, at p. 222 and pl. XIII, 4.

[10] *Jitaṁ bhagavatā* occurs on an agate seal-stamp found on a hill close to Parsenoi near Nagpur (*JNSI*, III, 100); on Nos. 33, 34, 35 and 36 of Bloch's list of Basarh seals (*ASIAR*, 1903-04, 111) and on certain seals found at Oceo (A. H. Dani, *Indian Palaeography*, 228). *Cf.* also Narasaropet Copper-plate Inscription of Siṁhavarman (D. C. Sircar, *Select Inscriptions*, 2nd ed., 469).

[11] This legend occurs on a clay seal in the collection of Shri R. C. Tandon, Allahabad. See *JNSI*, XXIX, 27.

[12] Penukonda Copper-plate Inscription of Madhava, *Select Inscriptions*, 2nd ed., 480.

[13] Indian Museum, No. 4624-A 2823.

[14] E. J. Rapson, 'Notes on Indian Coins and Seals, Part IV, Indian Seals and Clay Impressions', *JRAS*, 1901, 97-108, Nos. 1 and 2 and pl. facing p. 98, Nos. 1 and 2 J. Agrawal has published three sealings from this very site with this legend on one side and *Śrī Mātriśarmaṇaḥ* on the other, ('Some clay sealings from Sunet,' *JNSI*, XX, 66-68). We have noticed more than two dozen sealings bearing this

legend in the Indian Museum, Calcutta, of of which a few may be referred to here. No. 4651—A 12850 has the legend *Mātriś-arma* No. 4650-12849 *Śri-Vishṇudāsasya*, Nos. 4640-12848 and 4652-12851 have *Mānyah*. The legend *Śāṅkara-Nārāyaṇābh-yāṁ* also occurs on certain sealings in the Allahabad Museum, e. g., Nos. 266, 271, 292 etc.

[15] J. Agrawal, 'An Interesting Clay Sealing from Sunet', *JNSI*, XIX, 71-72. It was because of this belief that Agrawal did not accept the suggestion of taking the legend *Dharma karavya* on some Sunet sealings to 'have a purely devotional significance' and instead suggested that the legend refers to the 'resolve of the Yaudheyas to continue their fight against the Kushāṇas till victory was achieved (see *ibid.*, p. 70, text and fn.).

[16] See J. N., Banerjea, *Development of Hindu Iconography* (2nd ed.). 121 ff.

Archaeological Explorations in Basti District (U.P.)

by S. K. BHATT

Basti, like many other districts of India, is an administrative headquarters created by the British. In eighteenth century A. D. its existence was simply as a village. As the name itself indicates, it was populated by a few families at first but afterwards, as it seems, it began to take a bigger and wider shape and in 1801 A. D. it was selected as a tahsil headquarters of Gorakhpur district [1]. Later on, in 1865, it was declared as a separate district, lying between 26° 28′ and 27° 30′ north latitude and 82° 13′ and 82° 10′ east longitude. It comprises a tract of irregular shape. The length from north to south varies between 52 to 68 miles and the breadth from east to west ranges from 28 to 52 miles. The total area is 2795.5 sq. miles [2].

The boundaries of Basti district are formed by an international agreement on the north and a natural demarcation formed by river Ghaghara on the south. Its northern boundary is formed by a long tract of land, about 80 ft. in width, in the middle of which runs a series of brick-built columns. But its eastern and western boundaries are purely administrative ones. On the west lies the district Gonda and to the east is Gorakhpur district. On the south the river Ghaghara separates it from Fyzabad, while on the north the boundary touches with Nepal running at a distance of 20 or 30 miles from the outer range of the Himalayas.

So far as the archaeological explorations and excavations are concerned, unfortunately the district has been comparatively neglected. For the first time A. C. L. Carlleyle [3] explored a few sites of archaeological importance in 1874-75 and 1875-76, under the guidance of A. Cunningham. Subsequently in 1890 Fuhrer [4] explored a few more sites and published his list adding some more information. In February, 1897 V. A. Smith suspected Piparahava to be a stupa and told Mr. Peppe that relics would be found at about the ground level [5]. In the subsequent year Peppe excavated it and the famous Piparahava vase, containing Buddha's relics, beads, crystals, gold ornaments, cut-stars etc. was unearthed [6]. Later on, a few more exploration and excavations were undertaken by P. C. Mukherjee [7] in Nepal frontier in the year 1899. Then there is a big gap as no further interest was shown to conduct any exploration in the area.

No doubt, these archaeologists did much effort to find out and locate the sites but they were only partly successful in their efforts. The pottery evidence was totally neglected as it was not known to these archaeologists. So they fully depended upon literary evidences and stone objects, sculptures, inscriptions, and coins found from the mounds.

The information supplied by these archaeologists is also some times not correct. In this connection the statement of Carlleyle and Fuhrer regarding the location and identification of Hathikunda can be cited as one example [8]. The Nirvan Stupa of Konagamana as described by Fuhrer is another

example of incorrect identification of an archaeological monument [9].

Many of the sites and the Stupas, which have been explored by Carlleyle and Fuhrer, are not tracable now because of heavy rain-fall in the region. Many sites are disturbed by the villagers for the cultivation and quarrying of bricks. The identification of many historical sites mentioned in the Buddhist texts by Carlleyle and Fuhrer have been contradicted now. For example Carlleyle located Kapilavastu at Bhuiadih [10] and Rummindei near Sheopur [11] or between Sheopur and Budhapar, both in the southern part of Basti District, but nowadays both are identified with Tilaurakot and Rummindei situated in Nepal border.

Again in 1962-63 a team of Banaras Hindu University explored parts of Basti District under the supervison of A. K. Narain assisted by P. C. Pant, and a few more new sites were brought to light [12].

After 1964 the author started a village to village survey of the district and adjoining area in connection with his doctoral thesis on 'The Archaeology of Basti District from Early Times to 1200 A. D.' As a result, altogether sixty-seven archaeological sites were discovered which yielded the characterstic ceramic industries of the early historic period besides coins and other small antiquities (See Table). The most important site amongst these is Gularihavāghāt (lat. 27° 47′ N. long. 82° 28′ E.) which was discovered in Harraiya Tahsīl on the left bank of the river Manorama in Dec. 1967. From the surface explorations the site yielded the following ceramic industries :—

1. Black-and-Red Ware : both plain and painted (white on black and black on red surface in the case of paintings)
2. Black Slipped Ware : plain and painted (white and black, in both pigments)
3. Grey Ware.
4. N. B. P. and associated red ware.
5. Red ware of varied fabric and type.

1. Black-and-Red Ware

The finding of Black-and-Red Ware at Gularihavāghāt adds a new name to the group of the sites yielding the said ware in the Gangetic plain. If the migratory pattern of Black-and-Red Ware suggested by D. P. Agrawal [13] is considered in the light of our evidence, it will not be improper if the arrow from Chirand going to Rajghat is turned via Gularihavāghāt in Basti.

Black-and-Red Ware of the site shows a poor texture of less lavigated clay which also contains husk, mica and sand. Pots are wheel-made.

A. Plain Black-and Red Ware : the fabric of the plain Black-and-Red ware industry leads to categorize it as following :—

i. Coarse fabric : The clay of the sherds belonging to this category is very coarse and micaceous, the firing has resulted in two zones, black and red, in the core. The outer surface of almost all sherds is treated with red wash. There are a few sherds only to show the application of the red slip. The interior of the sherds has no surface treatment. A few sherds have mat impression over the outer surface.

ii. Medium fabric : Sherds in this group are treated with slip on both sides. Numerous small cavities in the core suggest its high porosity. The core is dominated by black zone due to the use of husk. In these specimens the potter has taken much care about the surface treatment.

iii. Fine fabric : Sherds of this group are not so fine as the south Indian Megalithic Black-and-Red Ware, but it is finer in Gularihavāghāt Black and Red ware industry. Sherds are well fired with red slip applied on the outer surface. The fine fabric sherds give metallic ring. The clay is less porous and mica becomes rare. The core of the sherds is tough and hard with prominent red zone.

SHAPES

VASES : long, featureless and sometimes thickened rim, carination near the neck.

BOWLS : straight and convex sided.

DISH ON STAND : The stand is hollow and long with greyish core and red slip on outer surface. The inner portion and rim is black due to inverted firing. The dish is similar to shallow bowl, the inner portion and the rim portion is black and outer portion is red. Sometimes it is treated with red slip also.

B. Painted Black-and-Red ware : This group of potsherds is similar to the preceding group in its clay, surface treatment and the technique of firing but a few specimens of fine texture are also noticed. The pots are also wheel-made and they differ from the former group having vertical, horizontal, criss-cross and zig-zag paintings done with the help of the brush. The outer surface is treated with red slip and painted in black. Sometimes the black pigment is used in paintings in inner portion on black washed surface. Paintings show a common use of white pigment also. The vertical lines are drawn from top to bottom resulting in thinner ends.

2. Black Slipped Ware

The black slipped ware industry of the site is both plain and painted. The clay and its texture, lavigation and firing are the same as reported from other sites in the Gangetic plain. The sherds are treated with black slip on both the sides. **In comparison to the N. B. P. ware, these are thicker, having a** little coarser texture. The core is generally black and sometimes greyish black. Paintings done with the help of brush, are linear in black and white pigments. The paintings comprise vertical and horizontal lines, criss-cross, zig-zag, and goemetrical designs having a regularity in their placement [4].

3. N. B. P. and Grey ware

These industries are very common on the site as well as in the district. The clay, lavigation, texture and fabric is the same as reported from the other sites of the Gangetic plain.

SHAPES :

Grey Ware :

BOWLS : convex sided sharpened rim

ii. Rounded side with sharpened rim.

iii. Straight side and sharpened rim.

DISHES : Shallow and short sharpened rim

ii. Incurved side with straight sharpened rim.

iii. Inturned featureless rim.

VASES : i. with outcurved rim bevelled at the top and concave constricted neck.

BASINS : i. convex side with outcollared rim.

ii. rounded side with elliptical rim.

SHAPES IN N. B. P. WARE

BOWLS : i. flanged bowls with its variants.

ii. convex side with featureless and sharpened rim. flat base.

DISHES i. inturned featureless rim, convex side, sagger base.

ii. vertical, externally bevelled rim, slightly convex side.

4. RED WARE

This industry is reported from the site in its two stages :

(i) Pre- N. B P.

(ii) N. B. P. associate

Red ware of the pre-N. B. P. stage can be divided into three sub-groups on the basis of their surface treatment.

A. Slipped red ware : these are usually slipped on both the sides, but there are exceptions of only one side treatment also. The fabric is noticed both, medium and thick. There are stone particles and husk used as degrasent. Mica is prominently used. porosity in sherds is noticed by small cavities on the surface. Red zone is prominent in the core.

B. Washed red were : These are of medium fabric and well fired, if compared with other sub-groups. A few sherds show the evidence of the use of the black slip over the red surface but it is generally washed with black pigment. Sometimes the wash is limited to the rim portion only. Parallel horizontal grooves are also noticed on a few sherds as ornamentation. We notice engraving and graffiti marks also.

C. Wares devoid of slip or wash : These are of medium to thick and coarse fabric. Wares are highly porous with the prominent use of husk and mica. The clay is coarse and less lavigated with generally black core.

Shapes : i. VASES; generally featureless and sharpened rim, carinated near the neck and concave body.

ii. BOWL-cum-lid with clubbed rim and uniformly thickened straight side.

iii. Perforated footed vase.

iv. Storage jars and beakers are suggested by the fragmentary specimens.

N. B. P. Associate : It is made of well lavigated clay by the same potters. The typology and the fabric is also similar to that of the grey ware. The only difference is that it has been fired in oxidizing condition. Therefore the colour of the pot and its section has become red or pinkish instead of greyish or blackish. For the surface treatment red slip is applied. SHAPES : Dishes and Bowls.

Besides this, coarse red ware associated with N. B. P. ware on the other sites of the Gangetic plain is also noticed. Sherds of this group are of coarse to medium fabric. Red slip is applied for surface treatment. Noticeable shapes are vases decorated with impressed vertical strokes externally and lipped bowls. Miniature vases are also noticed.

Similar pot-sherds were explored from the surface at Banawarighat which lies on upstream of the Manorama river about 8 kms. north west of Gularihavaghat. The other sites in the vicinity are devoid of these painted black and red and painted black slipped wares and contain mostly plain *Black* Slipped Ware, Grey Ware, N. B. P. Ware and its associated red wares.

Notes

[1] *District Gazetteer of United Province*, Vol. XXXII, 1901, 185.

[2] Ibid, I.

[3] A. C. L. Carlleyle, *Archaeological Survey of India-A report* Vol. xii.

[4] A. Fuhrer, The Monumental Antiquities and Insciptions in the North-Western Provinces and Oudh, *A. S. I.*, Vol. II, 1891.

[5] P. C. Mukerjee, Antiquities of Kapilvastu, Tarai of Nepal, *A. S. I R.*, 1901, 43.

[6] Ibid. 43; *D. G. U. P.* Vol. xxxii, 43; Peppe & Smith, *J. R. A. S.*, 1898, 573 ff.

[7] Op. cit. [5].

[8] "About 350 ft. to the north-north-west there is a deep, somewhat circular shaped tank about 120 ft. breadth across called the Hathikund' or the 'Hathigadh', which probably represents the 'Hastigarta' of Buddhist tradition."

Carlleyle, *A. S. I. R*, Vol. xii, 145. But regarding this identification Fuhrer says "The circular tank about 340 ft. to the south of Bhuila Tal still called, according to Mr. Carlleyle, 'Hathikund' was identified by him with the 'Hastigart' of Hiuen-Tsang and General Cunningham is perfectly convinced that this is the spot indicated by in Chinese texts. The *chaukidar* and inhabitants of the neighbouring village state that the name of 'Hathikunda' was given to the tank by Mr. Carlleyle himself and that this name was utterly unknown in that part of country before the arrival of Mr. Carlleyle."

Fuhrer, *A. S. I. R.* Vol. II, 1891, 222.

[9] V. A. Smith, Preparatory Note, Antiquities of Kapilvastu, *A. S. I. R.*, 3-4.

[10] A. C. L. Carlleyle, *Archaeological Survey of India, A Report*, Vol. XII, 113.

[11] Ibid, 189 ff.

[12] A. K. Narain and P. C. Pant, "A Summary Account of Archaeological Exploration in East U. P." *Bharati*, No. 8, Part I, 1964-65.

[13] *Puratattva*, No. 1, 1967-98, 70 ff.

[14] A datailed study of these sherds is to be published elsewhere.

LIST OF SITES IN DISTRICT BASTI

No.	*Name of the Site*	*Tahsil*	*Ceramic Industries*	*Other Finds*	*Previous Reference, if any*	*Remarks*
1.	Agonā	Haraiyā	Red ware	×	×	Circular mound
2.	Bairāgal	do	Red ware	×	×	×
3.	Banawārīghāt	do	Plain & painted Black-&-Red ware; plain & painted Black Slipped ware; Grey ware; NBP, ware; Red ware,	×	×	A chalcolithic site
4.	Bārāhakshetra	do	Red ware.	Structures	Carlleyle, *ASIR*, XII, 211. Fuhrer, *ASI*, II, 1891, 217; A. K. N., *Bharati*, No. 8, part I, p. 120.	×
5.	Bhuilādīh	do	Red ware.	Coins, structures sculptures and T. C. figurines	Carlleyle, *ASIR*, XII, Coins with— (i) Bull and Buddhist symbol; (ii) Sunga and Mitra coins (iii) Kushan coins (iv) Nickle coins (v) Bronze spring ring (vi) Several fragments of sculptures (vii) T. C. figurine of duck and Buddha. pp. 162–171 Fuhrer, *ASI*, II, 1891, 118ff.	Fort walls are still visible, surrouded by ditch and give an idea of a big fortified town.
6.	Gulrihvāghāt	do	Plain & painted Black-&-Red ware; plain & painted Black Slipped ware; Grey ware; NBP. ware and its associate Red ware; Red ware;	Stone and T.C. beads; pottery discs; iron nails; T.C. dabber; perforated cylinder; arrow head; waste flakes	×	A chalcolithic site

7. *Itawā*	do	Grey ware.	×		Only one sherd of Grey Ware was found as the whole mound is under the construction of a road.
8. Kopawādīh	do	Red ware.	Structures, brickbats	Carlleyle, *ASIR*, XII, 185. Fuhrer, *ASI*, II, 1891, 221.	×
9. Makhaurā	do	Red ware.	×	×	Associated with the '*Putresthiyajña*' of king Daśaratha.
10. Pandūrghāt	do	Black Slipped ware; NBP. & its associate wares; Red ware.	×	×	Associated with '*Pāndavas*' crossing the river Manoramā here.
11. Sabaī	do	Red ware	Structures, brickbats.	×	×
12. Sringanārī	do	Red ware	×	×	Associated with 'Sringī' Rishi, the chief priest in the Yajña of king Daśaratha.
13. Ujainiā	do	Red ware, Muslim glazed ware.	×	×	×
14. Bannī	Bastī	Grey ware; NBP. ware.	Sculpture, T.C. pestles.	×	×
15. Basahavā	do	Grey ware; NBP. ware; Red ware.	×	×	A stupa suspected.
16. Bhadanā	do	Red ware.	×	×	×
17. Bhadeśwaranāth	Bastī	Red ware.	X	X	A modern temple of Śiva

No.	*Name of the Site*	*Tahsil*	*Ceramic Industries*	*Other Finds*	*Previous Reference if any*	*Remarks*
18.	Bhoir	do	Red ware.	X	X	X
19.	Chamarahvāghāt	do	Grey ware, NBP. ware & its associate Red ware.	X	Fuhrer, *ASI*, II, 1891, 224.	X
20.	Devikurhā	do	X	Sculpture	X	A sun image in a modern temple
21.	Gerār	do	Grey ware; NBP. ware & its associates; Red ware. structures;	T.C. pestles; T. C. Potters stamp; T. C. figurines;	X	Suspected to be a big town.
22.	Haradevanāth	do	Grey ware; NBP. and associated Red ware.	T. C. pestles.	X	Modern temple.
23.	Karaūdīh	do	Red ware.	X	Carlleyle, *ASIR*, XII, 217. Fuhrer, *ASI*, II, 1891, 226.	No trace of mound though the village of this name still exists.
24.	Purānīkot	do	Grey ware; NBP. ware & its associates.	×	×	×
25.	Nagar	do	Red ware	×	Carlleyle, *ASIR*, XII, 217; Fuhrer, *ASI*, II, 1891, 225. Cunningham, *Geography of Ancient India*, 350. *Bhāratī*, 8, I, 119.	Suspected to be a big town.

26.	Rāmanagar	do	Grey ware. NBP. and associated Red ware; Red ware.	×	×	×
27.	Sabaīdih	do	Grey ware; NBP. ware; Red ware.	×	×	×
28.	Tārīpachīsā	do	Grey ware; NBP. ware & its associated wares; Red ware.	Stone bead; T.C. figurines; coins; bone points.	×	Tribal and Kushan coins.
29.	Waraidih	do	Red ware.	×	Carlleyle *ASIR*, XII, 220. Fuhrer, *ASI*. II, 1891, 227.	×
30.	Abbāsganj	Khalīlābad	Grey ware; NBP. ware; Red ware.	Coin.	×	Copper cast coin.
31.	Dhauraharā	do	Red ware.	Structures.	×	×
32.	Kopiā	do	Black Slipped ware; Grey ware; Red ware; Muslim-glazed ware.	Coins, thick pot-sherds with glass lump attached.	Fuhrer, *ASI*, II, 1891, 224. *Bhāratī*, 8, I, 120.	A fortified town surronnded by ditch; tribal coins.
33.	Magahar	do	Red ware.	Coin.	*Bhāratī*, 8, I.119.	Copper cast coin.
34.	Tameswarnāth	do	Red ware.	Coin.	Fuhrer, *ASI*, II, 1891, 226.	Tribal coin, modern temple.
35.	Ujārdih	Khalīlābad	Black Slipped ware; Grey ware; NBP. ware; Red ware.	Bone points, waste flakes.	×	×
36.	Bhainsā	Bānsī	Red ware.	Coin; structures; T. C. figurine.	*Bhāratī*, 8, I, 119.	Kushan coin.
37.	Deokali	do	Black Slipped ware; NBP. ware; Red Slipped and Red. ware.	T. C. potters impression stamps; structures.	Cunningham. *Geography of Ancient India*, 355.	It seems to be a town having stupa as its contour indicates.

No.	Name of the Site	Tahsil	Ceramic Industries	Other Finds	Previous Reference if any	Remarks
38.	Dharamsinghawā	do	Red ware.	T. C. skin rubber	×	×
39.	Digeswarnāth	do	Red ware.	Carved bricks, sculptures	*Bhārati*; 8, I, 119,	Two ruined temples.
40.	Fulawariā	do	Red ware.	T. C. spout; sculpture.	×	Siva image having three mouths, front facing to the east, locally called '*Bhavāni Sankar*'.
41.	Gosfāri	do	Red ware; Muslim glazed ware.	T. C. figurine.	*Bhārati* 8, I, 119.	×
42.	Paunā	do	Black Slipped ware; Grey ware; Red ware.	×	×	×
43.	Piparpatiā	do	Grey ware; NBP. & associated Red ware; Red ware.	Waste flakes, bead making rod.	×	×
44.	Purainā	do	Grey ware; Red ware.	T. C. pestles.	×	×
45.	Tharaulī	do	Black Slipped ware; Grey ware; NBP. ware; Red ware.	T. C. pestles, structures.	×	×
46.	Awainiā	Domariāganj	Black Slipped ware; Grey ware; NBP. ware; Red ware.	Structures.	×	Half portion of the mound is inhabited by present people.
47.	Bhāratbhārī	do	Red ware.	Structures; T. C. figurines.	Fuhrer, *ASI*, 1891, 223.	Suspected to be a big city.
48.	Buddhīkhās	do	Grey ware; NBP. ware; Red ware.	×	×	Mound is occupied by present people.

49.	Chaisāre	do	Black Slipped ware; NBP. ware; Red ware.	T. C. beads, structures	×	×
50.	Dhauraharā	do	Red ware.	×	×	×
51.	Gālāpār	do	Red ware.	T. C. animal figurine.	×	Forestified area.
52.	Hansuṇī	do	Red ware.	T. C. human figurine, structures	×	×
53.	Jiganā	do	Red ware.	×	×	Modern temple.
54.	Kateśwarnāth	do	×	×	×	A Modern temple associated with Kuśa, son of king Rāma, and previously this place was known as Kuśeswarnāth.
55.	Kaṭhelā	Domariāganj	Red ware	Sculptures	Fuhrer, *ASI*, II, 1891, 223.	Suspected to be a big town.
56.	Kesār	do	Red ware.	Carved bricks piled in the plinth of a modern house.	×	×
57.	Kopā	do	Red ware.	T. C. human figurines; structures.	×	A town suspected.
58.	Nakhtardeoriā	do	Red ware.	Ink-pot type lid.	×	×
59.	Perārī	do	Red ware.	×	Fuhrer, *ASI*, II, 1891.	×
60.	Sarpokā	do	Red ware.	T. C. Pestle, pottery disc.	×	Mound is under construction of tubewell and drains forirrigation.

No.	*Name of the Site*	*Tahsil*	*Ceramic Industries*	*Other Finds*	*Previous Reference, if any*	*Remarks*
61.	Tenuhār	do	Black Slipped ware; Grey ware; NBP. ware; Red ware.	T. C. potters stamp, ink-pot type lid, handmade human figurines, structures.	×	Suspected to be a big town.
62.	Karamā	Naugarh	Grey ware; NBP. ware. Red ware.	T. C. figurines and coins are reported by local people.	×	Suspected to be a stupa.
63.	Genewariā	do	Grey ware; NBP. ware; Red ware.	Iron ring, structures.	×	Suspected to be a small fort.
64.	Malapār orNanakār	do	Red ware.	×	×	×
65.	Piparahwā	do	Grey ware; NBP. ware, Red ware.	×	*JRAS*, 1898, 573 ff.	Stupa, Dr. N. R. Banerjee believes it to be ancient 'Kapilavastu'.
66.	Piparī	do	×	×	×	Seventeen small stupas are still visible.
67.	Soharatgarḥ	do	Red ware.	T. C. pestles, structures.	×	×

A study in the Stone Age of Khajuraho[1] in Central India

by KRISHNA KUMAR

INTRODUCTION

Renowned for the temples of the Chandella Period (10th-12th centuries A. D.), Khajurāho is otherwise unknown as a habitat of the prehistoric man. In the past, several Stone Age sites [2] were discovered in the valleys of River Ken and its tributaries, but the basin of River Khūdar—another branch of the former, where Khajurāho is situated—had attracted scant attention of the prehistorians [3]. The author explored the central region of the discoveries and to bring home their significance in the light of available evidence.

THE SITES AND THEIR LOCATION

Within a radius of 4 km. from village Khajurāho (Lat. 24° 51′ N.--Long. 80° 0′ E.) District Chhatarpur, Madhya Pradesh, are located ten Stone Age sites, on either bank of the River Khūdar and its affluents (fig 1). Of these, the two extensive factory sites lie within the revenue jurisdictions of villages Jaṭkarā and Benīgunj, and the rest (No A

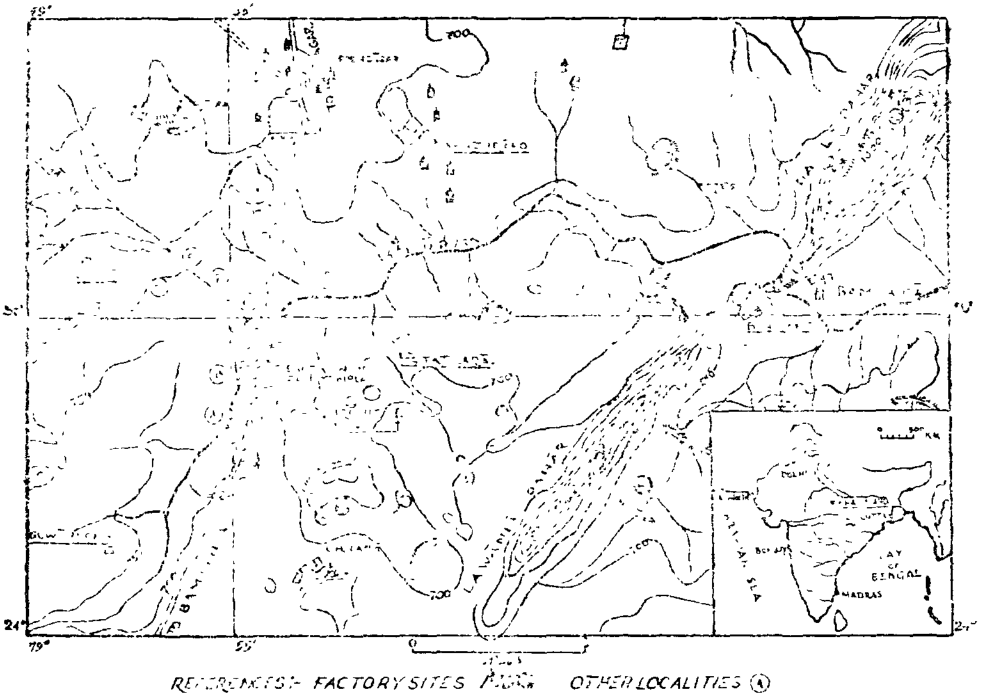


Fig 1

valley of River Khūdar during the period between 1961 64, and located two open-air factory sites and eight other localities [4] yielding artefacts of the Middle Stone Age [5], Late Stone Age and neolithic industries. The object of this paper is to report these to H) are located near Guāikachha, Sakerā, Khajurāho and Benīgunj.

The factory site situated on the Rājnagar-Bamīṭhā Road, at a distance of about 1 km. west of village Jaṭkarā, is the most extensive in this area. Located as it is on the right

bank of the River Khūdar (opposite to its junction with the Pāṭhā Nālā), the two fords [6] connect it with the other localities (No. A to G) situated respectively, on its north and west. It is dotted with a number of gneissic outcrops [7], in which microliths are found in abundance. As the site covers the cremation ground, it was found littered with the potsherds (ordinary red ware) of modern period.

The other factory site, though much smaller in area, is also located near a ford which connects villages Benigunj and Bamnaurā—situated on opposite banks of the river. Locality No. H, lying over a *nullāh* beyond Lawānia Pahar, indicates the eastward extension of the chain of Stone Age sites.

TOPOGRAPHY

The low-lying central tract around Khajurāho, where the Stone Age sites are located, is a level and often a stone-hewn plain. While the entire northern and western region is dotted with the masses of irregularly heaped boulders of gneiss, the area on its southern and eastern fringes is flanked by the cliffs of overlying Vindhyans. The valley in the central tract is drained by the system of a non-perennial stream—Khūdar Nadī, which flowing in south-west-north-easterly direction cuts deep gorges through the Vindhyan outliers and divides one of them into a pair of segments, known as Datlā and Lawānia Pahār, respectively. With a height of 1,000 feet (about 305 m.) from sea-level, the former is the highest range of the area. With shallow channels, the flat banks of this river-system are covered with the flood alluvium. Except some cultivated fields, the whole tract is sparsely covered with jungle.

Located over or near the gneissic outcrops in the central tract, all the Stone Age sites overlook the river or one of its affluents. "These small rocky eminences, now usually bare of cultivation, having a good all round view, are the favourite sites on which mesolithic hunters must have had their groups of huts" [8]. Probably it is due to the physical semi-isolation of the area, that the lithic industries of this area show a curious pattern of survival and progress.

GEOLOGY

Corresponding to its three-fold physical division, the area is geologically too, divisible into three regions. The central tract, where Khajurāho with its Stone Age sites is situated, is more or less a plain with outcrops of the gneiss and other allied rocks. The north-western part is characterised by the Archaeans of Bundelkhand—a pink variety of granites—which is often relieved by low steep hills of quartz reef and numerous dikes and sills of black-basalt (Deccan Trap) cut through the gneiss. The geodes of the Deccan Trap contain varieties of agate, carnelian, opal, onyx, jasper, etc. The south eastern section lying in the Pannā Range of the Vindhyans, show the Lower Vindhyan Strata with outcrops of the Bijāwars at their base and occasionally also having the Kaimūr sandstones. While these formations are rich in variegated siliceous material like chalcedony, chert and agate, the most characteristic rocks of the Bijāwars are the layers of banded jasper of red colour, which are frequently intercalated amidst limestones and due to its highly ferruginious nature they are also found impregnated with the haematite concretions. These geological formations were probably the source of raw-material for the various lithic industries of this area.

A dry stony red earth, known as *rāṅkar*, is the commonest soil in the gneissic area and

the hills, which generally speaking is less fertile. Of other soils, *kābar*, *parwā*, and *motā* (*mār*) deserve mention; while the first two are light soils, the last one is an inferior variety of the black cotton soil and met with only in the intrusive dikes of the trap-rock. Lastly, a thin layer of the alluvium has been deposited by the river on its flood-plain. The general poverty of the soil and the low rain-fall were perhaps among some of the factors responsible for the economic backwardness and cultural stagnation of the prehistoric Khajurāho.

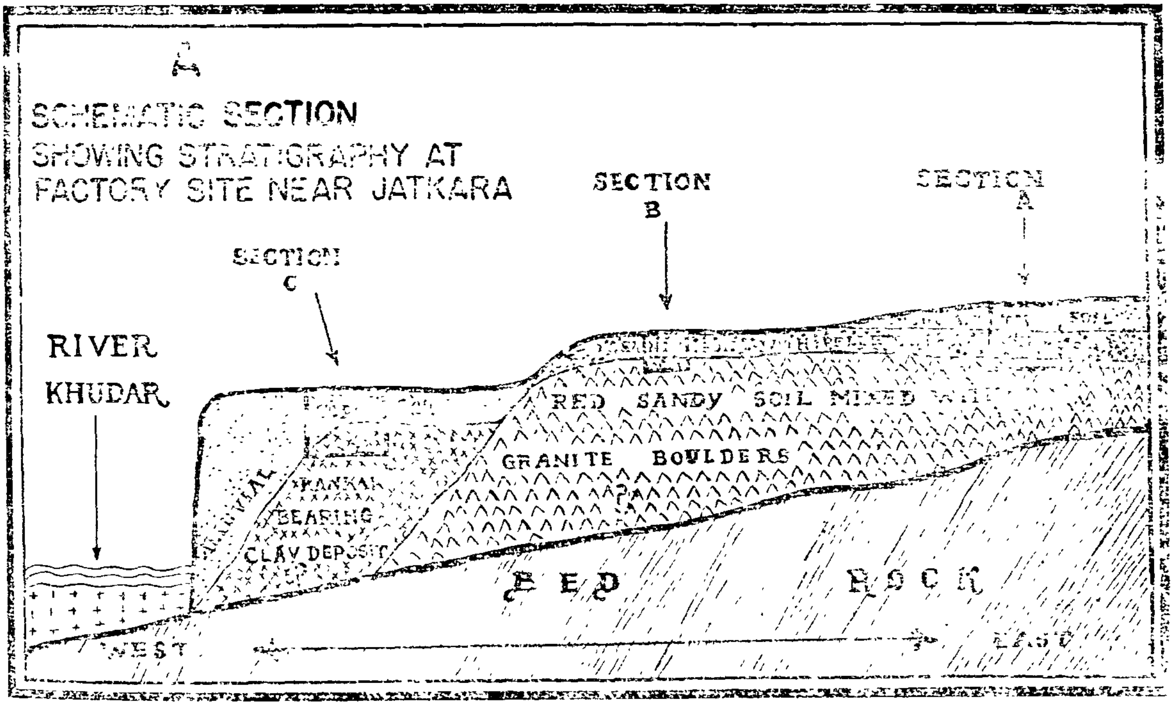


Fig. 2

STRATIGRAPHY

In absence of cliff-sections at any of the sites, it is difficult to make a correct appraisal of the stratigraphic position of different lithic industries in relation to various geological deposits, but an idea, though vague, may be formed on the basis of three small sections (fig. 2) noticed at the factory site near Jatkarā and described below :—

I. A recent road-section (Section A) at a high level, near the Bagrājin Devī Temple, [8 a] shows that a 18 to 48 cm. thick implementiferous deposit made of red sandy soil (hard *murum*) mixed up with stone pellets is underlain by a thick deposit of red sandy soil and granite boulders which finally rests over the gneissic bed-rock. Whereas the upper layer has yielded artefacts of the microlithic assemblage, the lower deposit does not yield any tool. The implementiferous deposit, in turn, is finally sealed by another 18 to 48 cm. thick layer of flood loam. Numerous flakes and nodules of basalt together with the haematite pebbles were gathered from the surface.

II. At a lower level, near the stream, where the top alluvial soil is subject to erosion due to the flow of rain-water and cultivation, the implementiferous red sandy soil was found exposed showing a few clusters of the microliths, which probably mark the spots of different workshops, where these tools were manufactured [9]. The Middle Stone Age artefacts and the neoliths were found loose on its surface. In a small pit (Section B), it was observed that the 41 cm. thick implementiferous layer is underlain by a red sandy soil deposit of unknown thickness, but the former did not yield any artefact other than the microliths.

III. Another section (Section C), situated at a still lower level, near the river bank, consists of a *kaṅkar* bearing clay deposit of unknown thickness, sealed by a 64 cm. to 1·86 m. thick deposit of the alluvial soil. Although no tool was encountered in the kankary deposit, a number of microliths and neoliths, together with a small fragment of bone and a broken bead (fig. 6, A) were recovered from the surface of the alluvium.

From the foregoing description, it may be concluded that whereas the microlithic industry is contained in the implementiferous red sandy soil, the artefacts of the Middle Stone Age and the neoliths occur on the surface.

The Middle Stone Age Industry

It is essentially a flake-blade-scraper assemblage popularly known as 'Series II'-industry.

With the exception of a few flakes and four implements obtained from the factory site near Benīgunj, rest of the surface-collection comprising twenty tools and numerous flakes was solely made at the factory site near Jaṭkarā and a solitary convex scraper on pebble was picked up from the adjoining river-bed near Khūdar Bridge.

Since none of them was recovered from any of the geological deposits *in situ* and a few of them are slightly rolled or abrased, they may be taken to have been transported by the river from elsewhere, but in view of the freshness of most of the tools, the shallow river banks and the considerably damaged land surface at both the factory sites (due to the part played by various natural and human agencies), they appear to have been manufactured there itself. However, so far as the stratigraphic position of this industry is concerned, it has yet to be determined by a trial excavation at the site near Jaṭkarā as well as an intensive exploration in the upper and the lower reaches of the stream.

The artefacts are made on different fine grained rocks, but the majority of them are on chert. Though most of the flakes and implements have obtuse angled striking platform and unworked undersurface, the occurrence of round oval flakes with prepared platform and previous work before their detachment from cores, betrays the employment of the Levallois technique. As there are some parallel sided blades together with two fluted cores and a few tools are made on short, thick and parallel sided flakes, it indicates the knowledge of the flake-blade technique. While certain tools bear flutings or marginal retouch by wood hammer technique, others show a tenon or notch for hafting and also some efforts at blunting the backs and sides for easy handling. Sometimes they are so demunitive in size that they almost merge with the tools of the microlithic (Late Stone Age) industry, which appears to have evolved from the

former. They are stained red due to their occurrence on the red sandy soil.

Besides other artefacts characterstic of this industry, viz., various flakes, blades, scrapers, borers, a point, and two fluted cores, it also includes the unfinished specimens of a big pebble chopper [10] and a small handaxe [11]. Although the two doubtful finds are not of much archaeological value, they together with a small pebble scraper probably indicate survival of the Early Stone Age tradition in the succeeding stage. A close scrutiny of certain tools, particularly blades and fluted cores, testifies its advanced character, and reminds us of the Upper Palaeolithic facies of Europe. Some of the artefacts even show the patination marks of orange or dark colour in varying degrees. Typologically this industry seems to represent a purely food gathering economy, based on hunting.

The artefacts of this industry, are comparable to the Middle and Upper Palaeolithic tools reported from different parts of Bundelkhand [12] and elsewhere in India [13].

The Microlithic Industry

It is a mixed assemblage of the non-geometric and the geometric microliths of the Late Stone Age tradition together with an over-all majority of the short parallel sided blades.

As it profusely occurs in stratified deposit of the implementiferous red sandy soil at all the sites, it is perhaps the most prolific industry of Khajurāho.

Though it is manufactured on varieties of crypto-crystalline colloidal silica and rarely on quartz or trap, like many other microlithic industries of Bundelkhaṇḍ & Baghelkhand, it is essentially made on chert and chalcedony.

Besides the use of free flaking punch technique, this industry also shows the application of 'crested-guiding-ridge' technique in the preparation of short parallel sided blades. In addition to the tenons and notches intentionally provided for hafting, the artefacts bear secondary work by nibbling, oblique, steep and ridge-back retouch.

Probably owing to the small size of the available raw material, the blade industry of Khajurāho primarily consists of short and narrow parallel sided flakes (ribbon flakes) and is accompanied by a few backed blades, crescents and lunates with long chords, trapezes, triangles, arrowheads, points and scrapers on parallel sided flakes together with a number of various blades, points, scrapers, borers and burins, on assymetrical flakes as well as some scrapers, borers, points and burins ingeneously manufactured on exhausted fluted cores, their flakes and the broken tools.

The two factory sites abound in sharp and pointed flakes which in the absence of retouch can not be defined as 'microliths',in true sense, but they could have definitely served the simple needs of the prehistoric man; this fact is amply witnessed by the occurrence of a large number of used flakes.

Since the relative stratigraphic position of the Late Stone Age and ribbon-flake elements of this microlithic assemblage is not known, it may tentatively be taken to represent a mixed economy of the transitional (proto-neolithic) stage when the people had already switched over to the methods of 'subsistence agriculture', but in order to increase their food supply, they still resorted, to a large extent, to the old practice of hunting and fishing. It is also likely that though Khajurāho

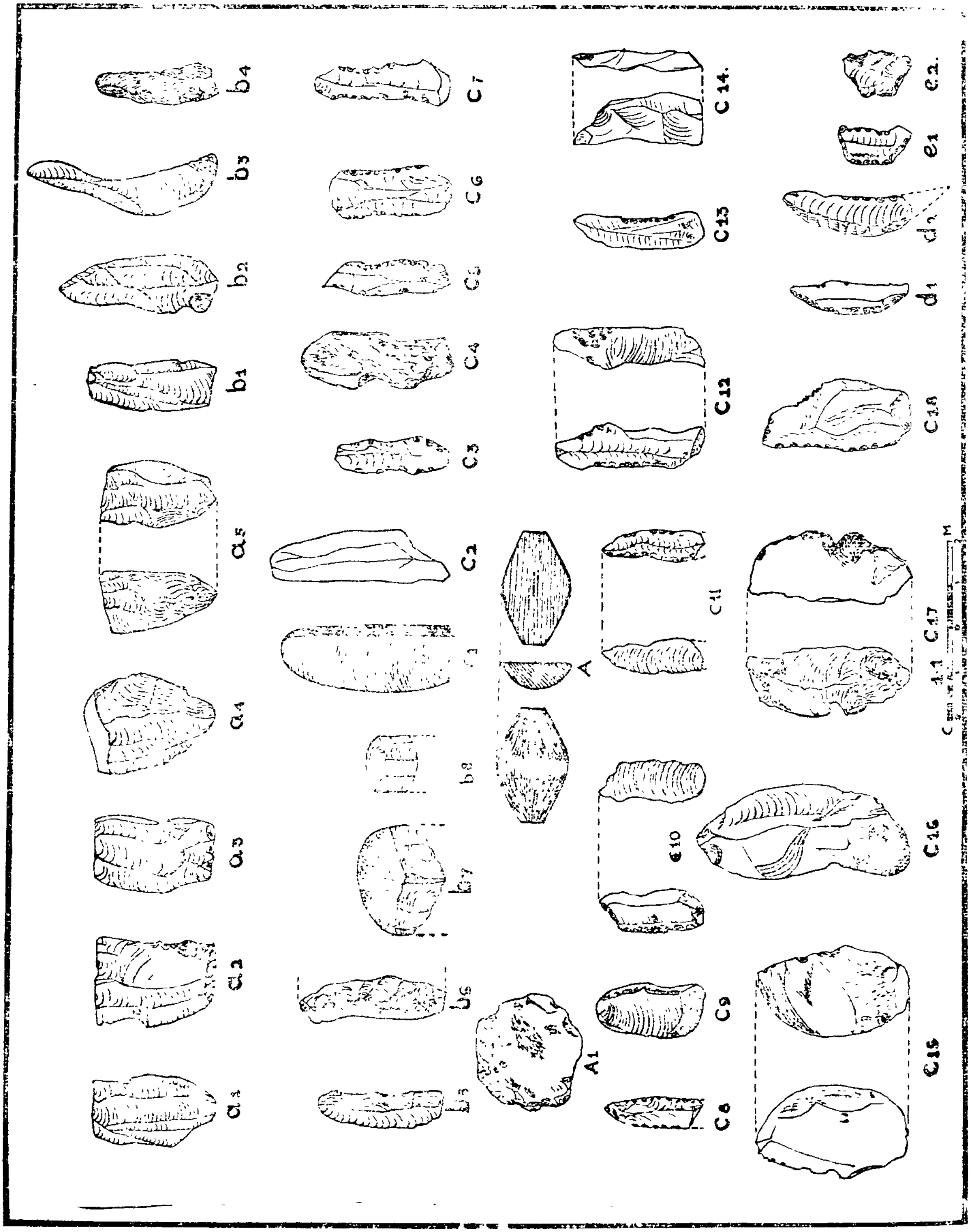


Fig. 3

was largely in the food gathering stage, still the Short Blade Industry flourished there mainly to meet the demands of the Neolithic-Chalcolithic village communities settled along the arterial rivers, in the neighbourhood where copper being a rare and costly material [14] its use was substituted by the ribbon-flake tools.

Whereas similar mixed microlithic assemblage of urban and hunting types have been reported from Tripurī, [15] Chhoṭā Simlā (Jabalpur), Pachmarhī, etc., [16] in Central India and Karāchī District in Sind[17], most of the artefacts of this industry are techno-typologically comparable with the lithic remains found in the Neolithic-Chalcolithic levels at different sites in Central and Western India.

Not taking into consideration the multitudinous ordinary cores, various dressing flakes, as well as numerous used flakes and semi-finished tools, the artefacts of this industry my be classified into following types and sub-types :-

I. *Cores* :—(i) Short fluted cores with pointed end, 107 (fig. 3, a1); (ii) with oblique end, 14 (fig 3, a2); (iii) with flat base, 4 (fig. 3, a 3); (iv) showing cross-flaking, 19 (fig. 3, a4 ; (v) with crested-guiding-ridge, 1 (fig. 3, a 5); and (vi) partly flaked, 10 (not illustrated).

II. *Flakes :*—(i) short and narrow parallel sided flakes, 437 (fi. 3, b1); (ii) with pointed end, 173 (fig. 3, b2); (iii) plunging flakes, 20 (fig. 3, b3); (iv) crested-guiding-flakes, 9 (fig. 3, b4); (v) secondary guiding flakes, 24 (fig. 3, b5); (vi) spur removing flakes, 2 (fig. 3, b6); and (vii) core-rejuvenation flakes, 11 (fig. 3, b7 & 8).

III. *Blades* :—(i) short and narrow single straight sided blades with single or double ridge, natural back and with or without a tenon, 9 (fig. 3, c1 & 2); (ii) with partly or fully blunted back, 36 (fig. 3, c3); (iii) with notched edge, 3 (fig. 3, c4); (iv) with pointed end, 12 (fig. 3, c5); (v) short and narrow double straight sided blades with uni-or bi-marginally retouched edge, 37 (fig. 3, c6); (vi) with serrated edge, 6 (fig. 3, c7); (vii) with pointed end, 1 (fig. 3, c1); (viii) pen knife blades with round, angular or pointed end, 17 (fig. 3, c9-11); (ix) parallel sided blade-*cum*-side scrapers, 3 (fig. 3, c12); (x) parallel sided pointed blade-*cum*-side scrapers, 2 (fig. 3, c13); (xi) parallel sided blade *cum*-borer, 1 (fig. 3, c14) (xii) ordinary blades with natural back and use marks on edge. 5 (fig. 3, c15); (xiii) with double edge a d a tenon, 1 (fig. 3, c16); (xiv) with single edge, tenon and notch, 1 (fig. 3, c17); and (xv) with pointed end, 1 (fig. 3, c18).

IV. *Lunates* :—(i) with ridge on dorsal surface, 21 (fig. 3, d1), and (ii) without ridge, 11 (fig. 3, d2).

V. *Trapezes :*—(i) with two oblique sides and the back blunted by steep retouch and use marks on the edge, 1 (fig. 3, e1); and (ii) with oblique retouch on the three sides and serrated edge, 1(fig. 3,e2).

VI. *Trapezoids* :—(i) with three sides blunted and use marks on the edge, 1 (fig. 4, a1); and (ii) with one or two sides blunted and use marks on the edge, 3 (fig. 4, a2).

VII. *Triangles :*—(i) scalene, 22 (fig. 4, b1 ; (ii) isocele, 6 (fig. 4, b2); and (iii) scalene made on a thick ordinary quartz flake, 1 (fig. 4, b3).

VIII. *Points* :—(i) leaf shaped points with a blunted or unblunted thick side and without a notch or tang, 25 (fig. 4, c1&2); (ii) with uni-marginal retouch and with or without a notch

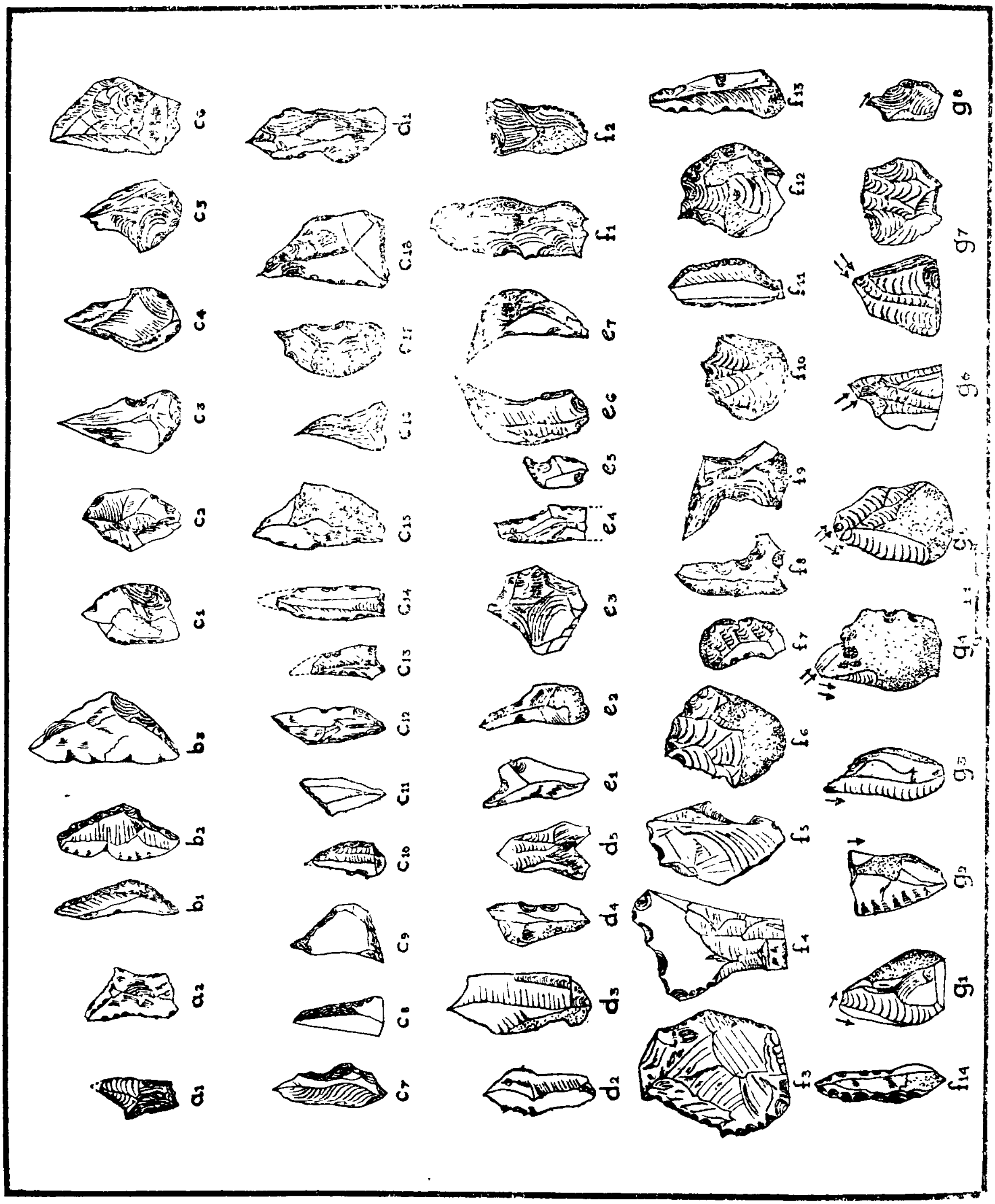


Fig 4.

or tang or with both, 19 (fig. 4, c3); (iii) similar to above but with bi-marginal retouch, 48 (fig. 4, c4 & 5); (iv) similar to above but showing pressure flaking in the centre of the dorsal side, bi-marginal retouch and a tenon, 1 (fig. 4, c6); v) crescentic points with partly or fully blunted arch, 21 (fig. 4, c7 & 8); (vi) with bulging back, 2 (fiig. 4, c9); (vii) with blunted arch and retouched chord, 8 (fig. 4, c 10); (viii) obliquely blunted points, 6 (fig. 4, c11); (ix) pen knife points, 1 (fig. 4, c12); (x) asymmetric hollow based points, 3, (fig.4,c13); (xi) symmetric hollow based points, 5 (fig.4, c14); (xii) beaked points, 15 (fig. 4, c15 & 16); (xiii) beaked point-*cum*-side scraper, 15 (fig 4, c17), and (xiv) beaked point-*cum*-end scraper, 1 (fig. 4, c18).

IX. *Arrow-heads*:—(i) with single shouldered tang, 6 (fig.4, d1); (ii) with double shouldered tang, 5 (fig.4, d2); (iii) with parallel sided tang, 9 (fig. 4, d3); (iv) oblique arrow heads with uni-marginally retouched tang, (fig. 4, d4); and (v) with double antenna, 3 (fig. 4,d5) [18].

X. *Borers* :—(i) with uni-marginally retouched short or long end, 17 (fig. 4, el & 2); (ii) with bi-marginal retouch, 12 (fig. 4,e3): (iii) drill with bi-marginally retouched long borer end, 1 (fig. 4, e4); (iv) beaked borers, 3 (fig.4, e5); (v beaked borer-*cum*-concave scrapers, 2 (fig. 4, e6); and (vi) beaked borer-*cum*-convex scraper, 1 (fig. 4. e7).

XI. *Scrapers* :—(i) Side scrapers, 60 (fig. 4, f1); (ii) side *cum*-end scrapers, 15 (fig.4, f2); (iii) side scraper-*cum* borers, 4 (fig. 4, f3); (iv) end scrapers, 22 (fig.4, f4); (v) end scraper with uni-marginally blunted tang, 1 (fig. 4, f5); (vi) end scraper-*cum*-borer, 1 (fig.4, f6); (vii) end-*cum*-concavo-convex scraper, 1 (fig. 4, f7): (viii) concave scrapers, 9 (fig. 4, f8); (ix) concave scraper-*cum*-borers, 20 (fig. 4, f9); (x) core-scrapers, 20 (fig.4,f10) (xi) convex scraper, 15 (fig.4, f11) (xii) convex scraper-*cum*-borers , 5 (fig. 4, f12); and (xiii) parallel sided scraper-*cum*-borers, 5 (fig. 4, f13 & 14) [19].

XII. *Burins* :—(i) with a vertical spall against a transverse spall, 1 (fig.4, g1); (ii) with a vertical spall against a steep retouch; a burin-*cum*-side scraper, 1 (fig.4 g 2); (iii) with a vertical spall against steep retouch, 1 (fig. 4, g3); (iv) with a set of two oblique spalls on either side, 2 (fig. 4, g4 & 5); (v) with a set of two small oblique spalls on one side, 1 (fig. 4, g6); and (vi) a burin *cum*-convex scraper, 1 (fig. 4, g7).

XIII. *Micro-burin* ;—is represented by a single specimen in the collection (fig.4, g8).

XIV. *Bead* :— A damaged barrel-shaped bead on banded agate, but showing no perforation (fig. 3, A) [19 a].

THE NEOLITHIC INDUSTRY

It is a ground stone axe industry represented by a surface-collection consisting of numerous flakes and nodules together with about a dozen implements in the various stages of production.

Whereas the trap flakes and nodules were gathered from different sites, the tool collection was solely made at the factory site near Jaṭkarā.

Excluding mace-heads made on granite and sandstone, rest of the artefacts are on dike-basalt.

Although flaking, pecking and grinding are the techniques which have commonly been employed in the preparation of tools, it appears as if the method of polishing has sparingly been used to finish the working edges of the axes only. A few of the tools successfully

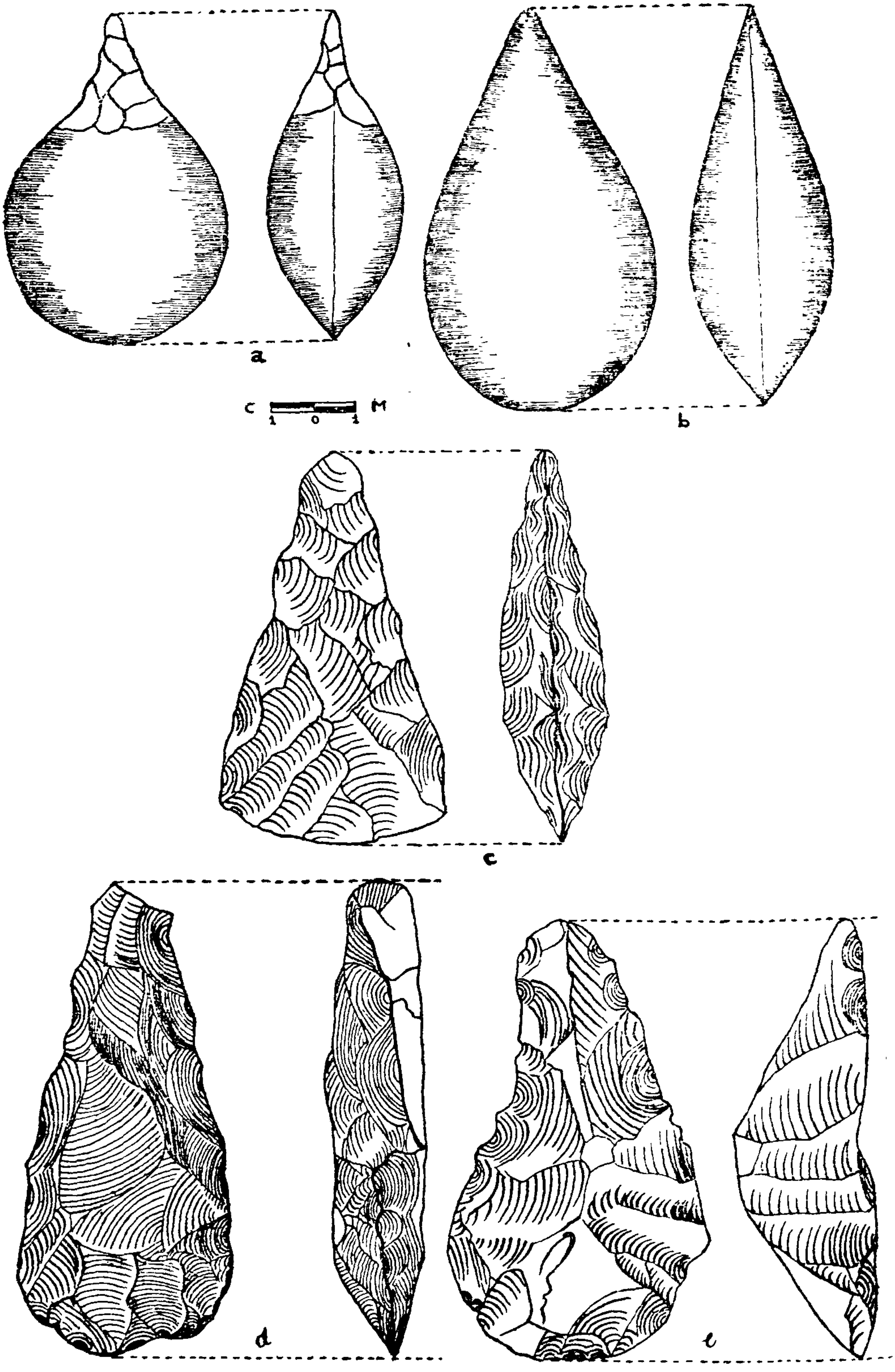


Fig. 5

manufactured with minimum work, on oblong multi plane nodules of trappoid rock, look almost as naturally shaped artefacts. The battered butts and damaged edges of the axes and the adzes; and the broken mace heads and sling balls are presumably due to their frequent hafting and heavy use The artefacts bear orange coloured marks of patination, in varying degrees.

Besides the casual surface finds from different parts of Bundelkhaṇḍ and Baghelkhaṇḍ, [20] neolithic celts have also been obtained from the upper level of the neolithic-chalcolithic phase at Eraṇ, [21] in central India. The neolithic tools of Khajurāho are comparable with those found at Brahmagirî, [22] Saṅgankallū, [23] Piklīhāl, [24] Nāgārjunakoṇḍā, [25] Tekkalkoṭā [26] etc. in south and different sites in central and eastern India [27].

The typological description of the limited material is given below :—

I. *Axes* :—(i) Showing lenticular cross-section and pointed butt-end, it has a marginally polished edge; with extensively battered butt, it is the smallest but most finished tool in the collection (fig 5, a). (ii) Similar to above but without any polish (fig. 5, b). (iii) Showing a rough quadrilateral cross-section and an irregular edge, it is an unfinished specimen with alternately flaked surface (fig. 5, c). (iv) With bifacially flaked straight edge and round butt-end, it could have also been used as a wedge (not illustrated). (v) A fragment of a polished axe with straight cutting edge (not illustrated).

II. *Adze* :—Showing a triangular cross-section and longitudinally bent body, it has a broad, steeply bevelled convex edge and a tongue-like end. A notch on the left margin

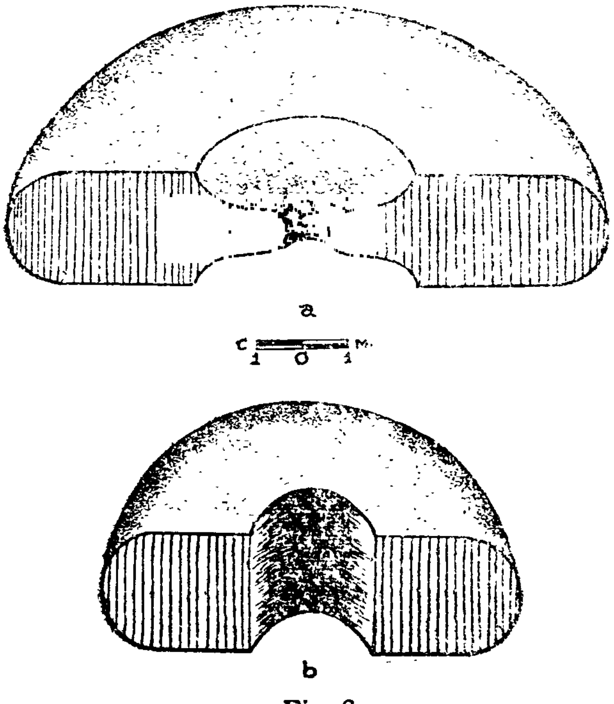


Fig. 6

of dorsal side indicates that it was probably hafted in the middle at right angle to the handle. With smooth natural surface on either side and unpolished body, it is a semi-finished artefact. (fig· 5, e).

III. *Hoes* :–[28] (i) With trapezoidal cross-section, steeply bevelled narrow edge and oblique butt-end, it is a typical specimen of an almost naturally shaped tool, flaked only on the flat ventral surface and left margin of the dorsal side with a little grinding on the dorsal edge, probably due to its constant use as a hoe [29].

(ii) With an almost trapezoidal cross-section, flat butt-end and thoroughly flaked body, it is an unfinished but the biggest piece in the collection (fig. 5, d) [30].

IV. *Mace-heads* :—(i) A broken piece on sandstone, showing incomplete hour-glass section with cup-like lateral depressions, worked from both the faces and ground surface (fig. 6, a). (ii) Another broken piece on granite; it is similar to above, but for the lateral depressions (fig. 6, b).

V. *Sling-balls* :—Two fragments of small spheroids, about an inch in diameter (not illustrated).

VI. *Stone-vase*:—A fragment of the rim of a vase or bowl trap, obtained from Locality G.

CHRONOLOGY

Since the stratigraphic position of the Middle Stone Age artefacts is unknown, they cannot be dated in absolute terms, however, in view of their advanced character (the presence of Upper Palaeolithic element), they may be ascribed to the transitional phase of the Middle and Late Stone Age. Contained as it is in a recent geological horizon the implementiferous red sandy soil deposit sealed by a modern flood layer the microlithic industry must have flourished in early middle Holocene. Although it is a mixed assemblage and no habitation site yielding ribbon-flake tools in association of painted pottery and copper–the two essential attributes of the Neolithic-Chalcolithic culture–has so far been discovered in this area [32], still the predominance of the short parallel sided flakes over other microliths; the persence of numerous short fluted cores together with a few crested-guiding flakes; the survival of a few backed blades, lunates and crescents with long chord and trapezes; and lastly the occurrence of neoliths on the surface of the implementiferous deposit containing the microlithic industry, are am ng the facts which point towards the possible symbiotic relationship of the microlithic and neolithic industries of Khajurāho with the Neolithic-Chalcolithic complex of central and western India, which as a result of the latest Carbon-14 dating has been placed within a date bracket of *circa* 2000-1000 B C. [33]. with a possibility of extension of the upper limit as late as 7th. century B. C. [34].

Since the neolithic industry does not occur in any geological context and the artefacts were found un-associated with and scattered over a greater area than those of other industries, they appear to be posterior [35] to the microlithic industry and thus mark the last phase of the Stone Age human activities at Khajurāho.

CONCLUSIONS

Since the material obtained as a result of the surface-collection is neither in plenty nor stratified, the conclusions deduced in the foregoing pages are tentative and need confirmation by an intensive field-work in this area. However, besides placing Khajurāho and its environs on the prehistoric map of India, the present discoveries have also broadly indicated that, like other parts of this sub-continent, this area too, though in a slow pace,

passed through most of the major phases [36] of human technological evolution in the Stone Age. As a result, the antiquity of Khajurāho generally held to be beginning only with the mediaeval period has now been pushed back to a remote past. It has also clearly shown that the peninsular neolithic culture had a very wide distribution which besides encompassing the Deccan and the Māļwā Plateaux, [37] also flourished in central India, and was not only confined to the south-east as hitherto thought by worman [38], Dani [39] and others [40]. A neolithic province for the central and western India has already been proposed by Krishnaswami. [41] , but as Thapar [42] has rightly pointed out, there is absence of a sharp distinction between the neolithic and the chalcolithic cultural stages manifested in these assemblages. As the transition between food-collecting and food-producing was perhaps a very short-lived phenomenon in this region, on the other hand, it has also been suggested by Mohapatra [43] that some of the non-geometric microlithic industries with pottery are neolithic rather than mesolithic. However, if Khajurāho and other sites in Bundelkhaṇḍ and Baghelkhaṇḍ regions yielding the microlithic and neolithic industries are thoroughly investigated, it is likely that we may get definite evidences of the pure neolithic culture in stratified context there also and thus the existing gap between the southern and the eastern neolithic provinces will be filled up by the central Indian neolithic province.

Though the picture that has emerged out of the work is nebulous, yet, if the large tract around Khajurāho, including the valleys of rivers Urmil and Kuṭnī–the two other tributaries of river Ken,—which still lies uninvestigated, is subjected to an intensive field work, it would not only reveal the pattern of the distribution of different lithic industries in this area, but may also focus new light on various problems concerning the stone age studies of this region, namely, the geological formations and their correlation with the climatic changes of the Quaternary; the stratigraphic position of the Middle Stone Age artefacts and the associated Upper Palaeolithic element; the relative stratigraphic position (if any) of the various components of the microlithic assemblage; the possible association of painted pottery and copper with the parallel-sided blade tools and their relation with the overlying neoliths; the existence or otherwise of rock-shelters in the surrounding hills, and yield other cultural and environmental data [44] as well; and thus a concrete image of the prehistoric Khajurāho will stand unveiled.

With the completion of the Benī Sāgar Dam, the vast land stretch lying within its catchment area will go under water. It would be in the interest of the prehistoric research, if the area is explored prior to the submergence.

Acknowledgements

The author wishes to express his deep sense of indebtedness to Professor (Dr.) H. D. Sankalia, Dr. V. N. Mishra, Dr. Z. D. Ansari and Shri S. N. Rajguru of the Deccan College, Poona, for so generously extending their help and guidance in the study of this collection, during his stay at their institute. He is deeply beholden to Shri M. N. Deshpande and Shri B. K. Thapar, respectively Joint Director General and Director (Explorotions), Archaeogical Survey of India, New Delhi, and Shri P. C. Pant of the Banaras Hindu University, who were kind enough to offer their valuable

suggestions. His grateful thanks are also due to Shri S. R. Rao and Dr. N R. Banerjee, the then Superintendents, Archaeological Survey of India, Agra, as it was due to their encouragements that he could do this field work. Lastly, but not the least, he is obliged to Shri V. Thomas Chandy, Surveyor, Archaeologica Survey of India, Varanasi, for kindly taking all pains in prepartion of the map of the area and the line-drawings of the stone implements illustrated here, and also to Shri S. K. Kapoor, who kindly typed the script.

Notes

[1] Originally submitted in a briefer form to the fifty-fifth session of the Indian Science Congress, Varanasi, (January, 1968).

[2] *Indian Archaeology 1957-58 A Aeview*, 25-26; *Ibid*, 1958-59, 26 & 72; B. Allchin, 'The Indian Middle Stone Age', *Bulletin of Institute of Archaeology*, No. II, (London, 1959), 1 ff; R. V. Joshi, 'The Stone Age industries of Damoh Area', *Ancient India*, No. 17, (1961), 5 ff, P. C. Pant, 'Some Lithic Tool Industries of Banda'. *Bharati : Bulletin of the College of Indology*, (B. H. U.), No. 7, pt. I & II, (Varanasi, 1963-64), 114 ff.

[3] J. Coggin Brown, *Catalogue ofP reshistoric Antiquities in the Indian Museum*, (Simla, 1917), 85; *Indian Archaeology*, 1961-62 *A Review*, 94.

[4] H. D. Sankalia, 'Fresh Look at Khajuraho', *Times of India*, (April, 10, 1966), 8; Sankalia, 'Socio-Economic and Geographical Background of Khajuraho', *Journal of Indian History*, vol. XLIV, pt. I, (April, 1966) , 31; *Indian Archaeology*, 1965-66 *A Review*, (cyclostyled copy), 40; Krishna Kumar, 'The Lithic Tool Industries of Khajuraho' *Proeeedings of the 55th. Indion Science Congress*, (Calcutta, 1968), 533.

[5] The terminology recommended by the Committee apointed by the Section I of the Inernattional Conference on Asian Archaeology, 1961, together with that recently suggested by Prof. H. D. Sankalia, in his presidential address to the First Annual Meeting of the Archaeological Society of India held at Varanasi on 23rd. February, 1968, has been adopted in this paper.

[6] The Archaeological significance of the river-crossings has already been shown by Drs. R. and B. Allchin in their paper 'The Archaeology of a River-crossing', published in *Indian Anthropology–Essays in the memory of D.N. Majumdar*, (Bombay, 1962), pp. 52 ff.

[7] A group of chisel holes was observed on one of the outcrops near the old road (shown with dotted lines on the map; fig 1), although their real significance is not known, they appear to have been left over by the stone diggers, who are often active there.

[8] D. H. Gordon, *Prehistoric Background of Indian, Culture*, (Bombay, 1958), 18.

[8a] Though it is a modern construction, which houses some fragmentary sculptures of Chandella period, yet it probably also perpetuates an old site of the cult of Mother-goddess, which had a wide prevalence in the neolithic society. Cf. D. D. Kosambi, *An Introduction to the Study of Indian History*, (Bombay, 1956), 31-46.

[9] Similar pattern has also been noticed at Birbhanpur. Cf. B. B. Lal, 'Birbhanpur: A Microlithic Site in Damodar Valley, West Bengal,' *Ancient India,* No. 14, (195), 14.

[10] A big flatish oval granite pebble; a single flake scar on its lower end results in a straight edge.

[11] A small limestone flake; two shallow flake scars on left side of the dorsal surface and a limited retouch on the right ventral margin form the working edge, with a 'S' twist. The lower tip is damaged presumbly due to its use; it could have served as a side scraper also.

[12] *Indian Archaeclogy,* 1955-56 *A Review,*40; (1956-57),. 15 & 79; 14 (1957-58), 26; (1958-59), 26, (1959-60), 46-48; (960-61), 62; (1961-62), 24, 54, 100; (1962-63), 32, 37, 39, 49, 88 & 89; D. H. Gordon, 'The Stone Industries of the Holocene in India and Pakistan' *Ancient India,* No. 6, (1950), 65; Allchin (1959), *op. cit,* 104, Joshi, *op. cit.,* 5ff; Sankalia, *Prehistory and Protohistory in India and Pakistan,* (Bombay, 1963), 140 ff.

[13] *Indian Archaeology,* 1964-65, *A Review,* (cyclostyled copy), 2, etc.

[14] R. E. M. Wheeler, *Early India and Pakistan,* (London, 1959), 137.

[15] M. G. Dikshit, *Tripuri*—1952, (Nagpur, 1955).

[16] Gordon, (1950), *op. cit,* 64 ff.

[17] Gordon, (1958), *op. cit.,* 19-21.

[18] The arrow-heads with pronounced tang or antennae seems to have evolved from points with incipient tang or notch for hafting.

[19] This tool-type may be compared with the remaining tool (type IV B) of Maski. Cf. B. K. Thapar, "Maski A Chalcolithic Site of the Southern Deccan,' *Ancient India,* No. 13, (1957), 91 and 97.

[19 a] Similar beads have been reported from the microlithic sites of Bombay. Cf. K. R. U. Todd, 'The Microlithic Industries of Bombay', *Ancient India,* No 6, (1950), 7.

[20] J. Cockburn, 'On the flint implements from the Kon ravines of South Mirzapur,' *Journal of Royal Asiatic Society of Bengal,* LXIII, pt. iii, (1894), 331-36; Brown, *op. cit.* 70 ff.; *Indian Archaeology,* 1955-56—*A Review,* 41; (1959-60), 48; (1961-62), 54; (1963-64), 43:

[21] See U. V. Singh in *Indian Prehistory*: 1964 (Poona, 1965), 230.

[22] Wheeler, 'Brahmagiri and Chandravalli (1947)', *Ancient India,* No. 4, (1947-48), 180-130.

[23] B. Subbarao, *The Stone Age Cultures of Bellary,* (Poona, 1948), 9.

[24] F. R. Allchin, *Piklihal Excavations,* (Hydrabad, 1960).

[25] K. V. Soundara Rajan, 'Studies in the Stone Age of Nagarjunakonda and its neighbourhood' *Ancient India,* No. 14 (1958), 49-113.

[26] M. S. Nagraja Rao, *The Stone Age Hill Dwellers of Tekkalakota,* (Poona, 1965), 55-68.

[27] A H. Dani, *Prehistory and Protohistory of Eastern India,* (Calcutta, 1960); V.D. Krishnaswami, 'The Neolithic Pattern of India', *Ancient India,* No. 16 (1960), 51 ff.; M. Chakrabarti, 'Occurrence of Neolithic Implements in West Bengal', *Bulletin of Cultural Research Institute,* No. 1&2 (1967), 89. ff.

[28] As these stray finds were obtained one each from the adjoining rain-gulley and a distant cultivated field, it is very likely that the factory site near Jaṭkarā was some sort of living place of the neolithic folk, who practised a primitive cultivation in the fields along the river course.

[29] The first find of a neolith at Khajurāho was made by Major General Cunningham in 1855. It is a small celt (hoe) made on fine trap;, with sharp truncated broken butt, one face is ground flat, Cf. Brown *op. cit.*

[30] Although both the artefacts are devoid of ground and polished edge, these could have been used as hoes or mattocks, which did not require a sharp cutting edge. (Cf. Gordon (1950), *op. cit.*, 79). They may be compared with the adze—*cum*-hoe discovered at Chandolī and similar other finds from Assam. Cf. S.B. Deo and Z. D. Ansari, *Chalcolithic Chandoli* (Poona, 1965), 31, fig. 18, no. 3.

[31] The stone vases have been reported from Santhāl Parganā, Mehī and Mohenjodaro in Indo-Pakistan sub-continent, and several prehistoric sites in western Asia. Cf. R.C.P. Singh, 'Stone vases from the Santhal pargana', *Patna University Journal*, vol. XX, No 1, (January, 1965), 152 ff.

[32] Except a small lump of lead obtained from the surface at Locality B, no metal was found from any sīte. Although in view of the inadequate field work, this point cannot be stressed, still as this sub-continent has never witnessed complete uniformity in its cultural pattern, it is not necessary that we get all the concomitants of the neolithic-chalcolithic culture at Khajurāho too.

[33] See D.P. Agrawal in *Indian Prehistory : 1964*, 140 & 200, *Indian Archaeology, 1967 68 A Review* p. 70

[34] U. V. Singh, *op. cit.*, 30.

[35] Sir Mortimer Wheeler has rightly remarked "In Central India, it would seem that the stone axes were superimposed upon, or commingled with the microlithic flake industries which were already rooted in the centre and south of the subconinent." Cf. Wheeler, *op cit.*, 91.

[36] True Early Stone Age industry has not yet been discovered at Khajurāho. Since it has already been reported from elsewhere in the neighbourhood (cf. *Indian Archaeology*, 1960-61 *A Review*, 59), it is very likely that, if this area is explored further, definite evidences of that industry may be obtained here also.

[37] Sankalia (1962), *op. cit.*, 239.

[38] E. C. Warman, Jr., 'The "neolithic" problem in the Prehistory of India', *Journal of Washington Academy of Sciences*, XXXIX, (1942), 118-20.

[39] Dani, *op. cit.*, 81.

[40] Sankalia (1962), *op. cit.*, 154.

[41] Krishnaswami, *op. cit.*, 28.

[42] B. K. Thapar, 'The Neolithic Problem in India', *Indian Prehistory : 1964*, 68

[43] See G. C. Mohapatra in *Indian Prehistory : 1964*, 79.

[44] As Dr. B. B. Lal, Chief Archaeological Chemist, Archaeological Survey of India, Dehradun, has kindly agreed to undertake a geochronological survey of the stone age sites of Khajuraho, his study is expected to throw welcome light on the environmental conditions and the dates of various lithic industries of this area.

A Note on makar Figurines

by T. N. Roy

Among the major groups of animals represented in Indian Art and Archaeology, the "crocodilians" number fewer than any other, yet these are depicted on pottery, sculptures, amulets and terracotta plaques. It is not surprising that in such a small assemblage there is not much difference in the general appearance of individual species [1]. Apparently the specimens studied by me appear to be the *Gavialis Gangeticus,* the only Indian crocodile inhabiting the Ganga and its tributaries even today [2]. The important ancient sites yielding such figured materials are Hastinapura, Kausambi, Rajghat, Vaisali and Kumrahar in the Ganga valley and Nagarjunakonda and Nevasa outside the valley.

The most distinctive figure of a *makar-mukha* appears in the Ganga valley round about the early centuries of the Christian era. The examples are from Rajghat and Hastinapura, the one situated on the bank of the Ganga and the other on its tributary, the *Kali-nadi*. The depiction is on a spout which bears at the luting point a decorative moulded design of a *makar-mukha*, i. e. a crocodile figurine. The earliest Rajghat specimen is from the top level of Period II dated from 2nd century B. C. to the beginning of the christian era, but at Hastinapura it is from the mid-level of Period IV dated from the early 2nd century B. C. to late 3rd century A. D. [3]. Similar spouts have also been reported from Kumrahar (Pl. VI, No 4) [4] and Vaisali [5] (Pl. VI, No. 5), Periods III dated from C. 100 to 300 A.D. But at Rajghat (Pl. VI, No. 3) these spouts become fairly common in Period III dated from O to 300 A.D. but in Period IV dated from 300 A. D. to 700 A.D., their frequency is less and the figurines become rough and conventionalized as compared to the preceding periods [6].

The depiction of the animal, particularly its head on the spout and its provenance only in the Ganga valley is not without significance. Giants among the reptiles, the crocodiles are the aquatic animals and the great importance of water to the crocodilian is shown by the shape and form of its head. It is the head which concentrates immediate attention as it remains above the water when the animal floats. And zoologically the only Indian crocodile called the *Gavialis Gangeticus* is also found in northern India confined mostly to the Ganga.

From a single Rajghat specimen, where the *makar-mukha* spout is found fixed to a complete red ware vase decorated on the body with a row of stamped *Triratna* symbol and a panel of petal like design, it appears that these vessels were used for ceremonial or ritualistic purposes.

The depiction of crocodiles also continued in other forms. In one of the interesting sculptures of a Bharhut stone railing on the obverse we find a *makar* figure (Pl. VI, No. 2) along with an inscription [7]. In another sculpture of the Sunga period acquired by the Allahabad museum from Kausambi (Pl. VI, No. 1), we get the crocodile motif on a stone

cross-bar [8]. In the excavations at Nagarjunakonda, a terracotta plaque representing *makar-kuṇḍalas* has been reported along with other terracotta collections [9]. As far as Nevasa is concerned, the *makar*-amulets (Pl. VI, No. 6) of terracotta have been reported in the early part of the Christian era [12]. As a part of ornaments its depiction continued as late as Gupta period. In one of the Vishṇu sculptures from Mathura belonging to the Gupta period, we find the representaion of two *makar-mukhas* in an ornament which is used as a head dress [11].

Notes

[1] The identification of species on the basis of their depiction on the varied materials in Indian Art will not be desirable to the students of archaeology as this will result in too much of zoological technicalities. This can, however, be done when more material from other Indian sites is presented. For the time being the paper may serve to stimulate more work in this direction.

[2] H. pope Clifford, *The Reptile World,* 43 and R. L. Ditmans, *Reptiles of the World,* 9.

[3] *A. I.* Nos 10 and 11, 71, pl. xxxii, 17.

[4] *Kumrahar Excavations*, 76.

[5] *Vaisali Excavations,* 49.

[6] On my own study of Rajghat material due to the courtesy of Prof. A. K. Narain.

[7] *I.A.*, 1959-60, 82 and *I. A.* 1960-61, 74.

[8] *I.A.*, 1959-60, 76.

[9] *I.A.*, 1956-57, 38.

[10] *I.A.*, 1960-61, 21.

[11] V. S. Agrawal, *Harsha-Charita,* 14.

Chronology of the Indian Megaliths—Some Considerations

by K. S. RAMACHANDRAN

Over a stretch of a century and a half innumerable megaliths have been excavated. Recently, a few habitational sites of this culture, particularly at Brahmagiri and Maski, have also been tackled. While the burials and the habitational vestiges have brought to light the varied cultural milieu of the megalithic complex, attempts at dating the burials have been fraught with difficulties and tend towards approximation only. This is so, even after the recent radiocarbon dating innovation. In this paper it is proposed to review the dates so far obtained through the conventional sequence dating methods and radiocarbon dates.

Conventional sequence datings

1. Wheeler's excavation at Brahmagiri, by far the most scientifically excavated megalithic site, has given a date-range of *C.* 200 B. C.-A. D. 50 for this culture [1]. In arriving at this date-range his considerations were :

(i) On the lower side, the earlier stone-axe culture represented by a late urn-burial overlapped into the earliest layers of the succeeding megalithic culture;

(ii) the terminal date was fixed by the commencement of the Andhra Culture, dated on the basis of Roman coins, Rouletted Ware sherds, etc.; and

(iii) the duration of the megalithic culture was determined by the 3-4 feet of habitational accumulation of the megalithic culture for which he has allowed a conservative time-lapse of nearly two centuries.

This date-range is equally applied to the burials, for Wheeler found identical ceramic types, numbering fourteen, both in the burials and habitation; 'the commonest of them being tulip-shaped vases, carinated bowls, dishes with incurved rims and bowls [2]. This became the sheet-anchor for later excavators for dating the burials.

2. Rea found seventeen urn-burials below a subsidiary *stupa* at Amaravati which in relation to the main *stupa* has been dated to *C.* 200 B. C. [3]. But a reassessment on stylistic grounds of the sculptures found here and the discovery of remnants of an Asokan pillar the date of the main *stupa* has to be pushed back still earlier and consequently that of the burials too.

3. From a cist-grave at Sulur in the Coimbatore district, Tamil Nadu, a bronze coin was obtained which Allan has identified as 'Eran struck' coin minted between C. third-second century B. C. [4].

4. A coin of the Roman emperor Augustus (27 B. C. —A. D. 14) was found from a megalithic grave in Coimbatore district[5].

5. A gold coin, probably a Roman Aureues issued from Constantinople and assignable to the fourth century A. D. was found from a barrow in the Nilgiris[6].

Thus we have a date-range between third century B. C. or a little earlier and the fourth century A. D.

Radiocarbon dates

The following are the available radiocarbon dates :

Site	TF no.	Age (half value 5730)	Dates
Bainapalle (Paiyampalli)	350	2330±105	380 B.C. [7]
Halingali	685	2030±100	80 B.C. [8]
Hallur	573	2905±100	955 B.C. [9]
	570	3055±105	1105 B.C.
Kakoria	179	200± 95	1750 A.D.[10]
Kotia	318	225±100	1725 A.D.[11]
	319	2200±105	250 B.C.
	320	490±100	1460 A.D.
	321	995±100	955 A.D.
	322	490±100	1460 A.D.

Of these, excepting two, one from Halingali TF 685) and the other from Kotia (TF 319), the rest are from habitation sites.

Date samples TF 318, 320—322, all from Kotia, and TF 179 pertaining to Kakoria, need not be considered, since, according to the dating laboratory, the samples were found contaminated; consequently give late reckoning. Further, the dates run beyond the tenth century, by which time, excepting for the atrophied megalithism in the form of *Viragals* which persisted until recent times and those of the tribal regions of eastern India, mega—lithism as such in India had died out.

Thus we are left with Paiyampalli, Halingali, Hallur and a sample (TF 319) from Kotia.

1. Paiyampalli—TF 350—charred grain—date-range 380±105 B. C.

This pertains to the Black-and-red ware iron culture; the dated sample coming from the habitation site. This habitation site has been linked to the burials excavated in the same place through identical pottery types, such as tulip-shaped vases in Black-and-red ware, funnel-shaped lids in all-black ware, ring-stands of the hour-glass type and three-legged jars in red ware. All these shapes, particularly the three-legged jars and the funnel-shaped lids are typical of the megalithic burials of the peninsular region. Further, they compare well with the Brahmagiri types.

2. Halingali-TF685-charcoal date-range 80±100 B.C.

The sample is drawn from the burial itself and the date-range is well within the time bracket observed elsewhere.

3. Kotia-TF 319–charcoal date-range250±100 B. C. The remarks regarding Halingali are applicable to this site as well.

Hallur-TF 570 and 573-charcoal date-range 1105±105 B. C. and 955±100 B. C. respectively.

These two dated samples of the neolithic-megalithic overlap phase came from the habitation site. Both the samples are from the same trench (Trench 1); the former from layer 4 and the latter from layer 5 at a depth ranging from 1.80–2.10 m. and 2.35–3.55 m. respectively. The earlier date is afforded by TF 570, the later by TF 573. These require careful consideration.

(i) It is rather strange that a sample from a later stratum (layer 4) gives an earlier date than the sample from an earlier stratum (layer 5); the difference being a century and a half. This is incompatible with the principles of dating on the basis of stratigraphy. In this light how far these dates could be valid is a moot question.

(ii) Although nearabout the habitation area megalithic burials were noticed, unfortunately none of them was excavated. Thus the habitation and the burials remain unconnected.

(iii) The brief notice of the excavation in *Indian Archaealogy 1964-65* (under print) does not mention the pottery from the habitation area; thus depriving their being linked with the known pottery shapes from similar burials elsewhere.

In the absence of indisputable connecting link as in the case of Brahmagiri or Paiyampalli, it would be hazardous to accept these dates for the burials as well. At best these could be considered applicable to the habitational strata and for Black-and-red ware and iron in this region. It would not be tenable to assume that Black-and-red ware plus iron ushered in the megalithic mode of burial, for all that we know the megalithic folk from their region of dispersal into India did not bring with them these two cultural items, but assimilated them as part of their cultural and burial-complex; thus their coming is posterior to Black-and-red ware and iron, for, according to the present day evidence, megalithic monuments and related habitational strata, all belong to Iron Age complex.

Interesting sidelight of these dates for iron, one of which is earlier than Atranjikhera [12] (1025+110 B.C.) would warrant a postulation of a bi-pronged diffusion of this metal into India; one from the north and the other from a place of contact on the west coast.

CONCLUSIONS

1. Conventional methods give a date-range from third century B. C. or a little earlier to fourth century A. D.

2. Radiocarbon dates of Paiyampalli, Kotia and Halingali give a central date-range well within the fourth century B. C. for the earlier side.

3. Radiocarbon dates from Hallur are open to question for (i) they pertain to habitational area unlinked with the burials through common bonds, and (ii) the dates themselves are incompatible with and against the accepted principles of dating through stratigraphical sequence.

4. Iron diffused into India from two points, one from the north and the other from a point of contact on the west coast.

Notes

[1] R. E. M. Wheeler, 'Brahmagiri and Chandravalli 1947 : Megalithic and other Civilizations, Mysore State', *Ancient India*, No. 4, 1948, 200-202.

[2] *Ibid.*, 232,

[3] Alexander Rea, 'Excavations at Amaravati', *Annual Report of the Archaeological Survey of India* 1908–09, (Calcutta), 1912, 88-91.

[4] Horace C. Beck, 'Notes on Sundry Asiatic Beads', *Man*, XXX, 1930, Art. No. 134.

[5] 'Early Roman intercourse with India', *Indian Antiquary*, II, 1873, 241–42.

[6] J. Hough, *Letters on the Climate etc., of the Neilgherries*, (London), 1879, 8-84 as quoted by Banerjee in *Ancient India*, No. 9.

[7] D. P. Agrawal, *et al.*, 'Radiocarbon dates of samples from Southern Neolithic sites'. *Current Science*, 35, No. 23, 1966, 585-86

[8] *Indian Archaeology—1967-68 A Review*, 71

[9] Agrawal, *op. cit.* for Hallur dates.

[10] Agrawal, *et al. op. cit.*, 35, No. 1, 1966, 4-5.

[11] Agrawal, reprint of Radiocarbon dates.

[12] Agrawal, *et al. op. cit.*, 33, No. 9, 1964, 266-69.

Printed at Shri Shankar Press, Lanka, Varanasi-5.

PURĀTATTVA

Bulletin of the Indian Archaeological Society

No. 4 1970–71

V. D. KRISHNASWAMI COMMEMORATION VOLUME

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B. M. PANDE

PUBLISHERS

INDIAN ARCHAEOLOGICAL SOCIETY,

C/o NATIONAL MUSEUM, JANPATH, NEW DELHI-11

SOLE DISTRIBUTORS

ORIENTAL PUBLISHERS

1488, PATAUDI HOUSE, DARYA GANJ, DELHI-6 (INDIA)

Editorial

The Indian Archaeological Society was formed at Varanasi in 1967 largely due to the personal efforts of Prof. A. K. Narain of the Banaras Hindu University, who was also its General Secretary till 1970, and Prof. H. D. Sankalia of the Deccan College, Poona, who has been its Chairman ever since. From the very beginning its heavy load of day-to-day work was borne by its young and energetic Asstt. Secretary Shri O. P. Tandon (now Deputy Registrar, B.H.U.). At one stage it appeared that the Society may remain confined to the non-governmental people since Shri A. Ghosh, the then Director General of Archaeology, had some sharp differences over the constitution of the Society. I very well recollect that meeting of the Executive Committee at Varanasi in which Prof. Narain expressed his great concern over the dispute. Rai Govind Chandra, the then treasurer, was very critical of the Archaeological Survey's attitude towards the Society. Luckily amogst us was Prof. S. Nurul Hasan, (now Minister of State for Education and Social Welfare) as one of our Vice-Presidents. As the passions rose very high he quietly came to the dias and one by one proposed such commendable amendments which were readily acceptable to all present there, including myself who represented one of the Govemmental institutions. On my return to Delhi I reported the whole thing to Shri Ghosh who was naturally very happy to learn the suitable amendments. Needless to say, since then the Society really became the first non-governmental professional body of archaeologists working in any capacity within the Govt. or outside. We are now a group of more than a hundred workers from all over the country.

From the very beginning the Society started publishing its own Bulletin called 'Puratattva', the Sanskrit word for 'archaeology'. Till 1970 it had already brought out three numbers. The entire credit for their publication goes to Prof. Narain since he managed it without any financial support from anywhere. Then, in Nov. 1970 the Annual Conference was held at Nagpur in which Prof. Narain proposed to Shri B.K. Thapar to become the General Secretary of the Society since he was shortly leaving for the U.S.A. as a visiting professor. Consequent upon this, Shri K.N. Dikshit, was elected its Asstt. Secretary and Treasurer, and I was given the editorship of the Bulletin. As luck would have it, Shri Thapar left for Cambridge in early 1971 and Shri Dikshit had to carry out the entire work of the Society, which I must say, he did very well. In May 1971 he even organized a Seminar on OCP and NBP Ware, the proceedings of which is now through the press. As far as I am concerned, the Bulletin is with you which records my failings more than success.

★

One thing for which we heartily thank the Director General of the Archaeological Survey of India and the Ministry of Education & Social Welfare is the grant of

Rs. 3,000/- for the publication of two issues of our Bulletin—nos. 4 & 5. Although, it is a very meager amount considering our nature of publications, still a happy beginning has been made and we hope that the Govt. will be helping the Society in the future also with a bigger amount so that we may publish regularly, two numbers of the Bulletin, and Proceedings of the seminars that the Society holds annually.

★

I take this occassion to report with great sorrow the sudden demise of V. D. Krishnaswami at Hyderabad, Andhra Pradesh, at the age of 64. His life had somewhat of a fictional quality abut it, but his work was well-grounded in reality. His field research ranged from the palaeolithic camps in the foot-hills of the Himalayas to the Iron Age megalithic cemeteries in Kerala. To each one he brought those talents which were peculiarly his He was always a very demanding man, of himself and of those who worked with him. By nature he was an extremely jolly man but he had also that infinite patience for detail which provided real substance and validity to the results of his researches. Acute observation in the field, an all-inclusiveness in recording and a search for proper terminology in the context of Indian prehistory were second nature of 'V.D.K.'—as we used to call him fondly.

He started his career as an extremely rash young student and ended with a very worldly-wise man. He often used to repeat two dictums of his life: firstly, Make others Great, they will make you Greater ! and secondly, in order to run an institution Man is more important than his knowledge.

We dedicate this number of the Bulletin to his memory as a tribute to his humane nature, erudite scholarship and rare organizational ability.

★

The present number of the Bulletin includes the report by Shri B. B. Lal of the outstanding discovery by him and Shri B. K. Thapar in the entire history of archaeological researches in the world—the remains of a ploughed field at Kalibangan, going back to 2300 B.C. or more.

Dr. B. S. Verma, presently in the Archaeological Survey of India, Patna, reports the neolithic complex of his excavations at Chirand. The complex is marked by a large number of bone and antler tools of a variety not found so far anywhere in India. Significantly enough, it also includes pots with tubular and channel spouts as well as Burnished Grey Ware with post-firing red ochre painting, analogous to those found in the Neolithic-Chalcolithic context of Western India. On the basis of C^{14} dates the earliest date of this complex goes back to 1900 B.C. The discovery, therefore, leads us to revise some of our tacitly accepted views on the Neolithic-Chalcolithic cultures given during the last two decades by Prof. H. D. Sankalia and Dr. F. R. Allchin. Their

theory of Iranian origin of these features may now be reopened for discussions.

The article by Dr. M. K. Dhavalikar of the Deccan College, Poona, takes into account the results of his recent excavations of Chalcolithic Kayatha. Herein he reviews their implications on the colonization of Malwa by the Kayatha folk. He also discusses the character, origin and development of the chalcolithic cultures in that region. He particularly deals with a very important aspect of this culture, viz. the Cult of the Bull. He, like Dr. B. S. Verma, also pleads for the revision of the existing views on the origin of the channel spouted bowl in Malwa. According to him they are likely to be indigenous and not Iranian.

Dr. F. Khan is our leading Palaeontologist. He has, in his paper, worked out a revised scheme of Pleistocene events in India on the basis of his studies on the mammalian fauna. Thus, to the utter dismay of many of us, he says that 'the mammalian fauna existing in India from the first to the third glaciation is unknown so far, and......the fauna of the last glacial age is scantily recognized'. Unfortunately, in the present study he has not taken into account the fossils which have been collected by Prof. Sankalia in a closely observed stratigraphy at Nevasa, etc., or Prof. G.R. Sharma's collections from the regular deposits of the River Belan in U.P.

Shri R. C. Gaur of the University of Aligarh in his masterly analysis of the proto-historic problems of the Ganga-Yamuna doab has tried to work out the cross-currents of the cultures from the Pre-Harappan times to the beginning of the Iron Age. He has specially dealt with the problem of the OCP and his excavations at Lal Qila.

My own paper is an attempt to find out the answer of one of the age old problems with us—what was the immediate source of the Indian megaliths? There seems to be some good evidence which indicates the Gulf of Oman as the probable source but more field work in south-east Arabia alone can give it the required exactness.

★

In this number we have added a few new columns: 'Notes and News' and 'Readings in Indian Archaeology'. Both the columns are designed to make the journal most useful to the research workers, particularly in India. The 'Notes and News' contains short articles on new discoveries focussing our attention pointedly to one problem at a time as also the programmes of forthcoming seminars, lectures, etc., to be organized by learned Societies and Institutions. The 'Readings in Indian Archaeology' contains the clippings from important articles published in those foreign journals which are normally not available in Indian Universities.

S. P. Gupta

V. D. Krishnaswami (18-1-1905/15-7-1970)

V. D. Krishnaswami (18-1-1905/15-7-1970)

The otherwise complacent cockles of official Indian archaeology received a flutter of fraternal anguish at the most unexpected passing away at Bangalore on 15th July 1970 of V. D. Kirshnaswami, M. A., Dip. Arch. (Cantab)., during a post-operative convalescence which did not hold out any major threat to his life. It might be conventional to say that a leading Prehistorian and field expert in India had been snatched away from our midst. But it would be no platitude to add that with his passing away, a transition from one age to another had been heralded. Anyone who had even had a nodding acquaintance with the outwardly forbidding but inwardly genial personality of Krishnaswami would have to carry the memories for a life time. In fact, the entry by Krishnaswami into any company, social or academic, immediately electrified the atmosphere for, in the style of his performance, he was often not unlike the mastodens stampeding across primeval swamps.

Born in a Tamil Vaisnavaite family in a village which had produced legal luminaries and public figures, when Krishnaswami qualified himself for a geologist's profession by graduating from the Madras University, and immediately started casting a good look at the Pleistocene environment of early man around Madras for launching on its study, it could almost have been the unexpressed dream-desire of Bruce Foote fulfilled, in this part of our land. But the agonising pilgrimage he made trom stage of acquisition of firm knowledge and the tools for his job, to the attainment of necessary opportunity and the station for getting recognition therefrom had been, in his case, a vital factor which moulded his temperament and produced an aggressive and restless personality. Undeterred by set-backs or administrative vicissitudes, he had always kept his goals clear in any venture, and had brought to their achievement a spectacular, and provocatively novel and positive character.

His collaboration in the Yale-Cambridge Expeditions of 1935 for the Himalayan Glacial studies in Kashmir under Dr. Helmut De Terra and later, his intensive continuation of work with Paterson in the area around Madras where he had started his pioneering studies of Early Man, a few years before, are all part of his unflagging zeal in the work. His early academic laurels were reflected in his stint as a teacher of geology and geography, and in his becoming recipient of a fellowship of the University of Madras that enabled him to repair to the University of Cambridge where he acquired the Diploma in Archaeology and worked under Prof. Miles Burkitt, and

fully utilised the opportunity for extensively familiarising himself with Stone Age studies in France, Germany, etc., in the company of such acknowledged stalwarts as Abbe Breuil, Vallois, Peyrony and Frederick Zeuner.

These were followed up with his share in India subsequently in the Gujarat Prehistoric Expedition 1940 along with Dr. Sankalia, and later his organising the Pan Indian Prehistoric Expedition with Dr. Zeuner in 1950. Those who were associated with him in the field have realised how much of an insight he had in field studies especially in original physiomorphic and typological aspects of Stone Age research. His other great work was the first organised exploration and scientific documentation of the megalithic monuments and types in Chingleput, Pudukkottai and Cochin between 1944-50 which he completed for the Archaeological Survey of India with his characteristic meticulousness, not only resulting in many technical papers by him and jointly with his colleagues in the meanwhile for the Science Congress and other learned bodies, but also the opening up of the entire megalithic problem, thanks to a working standardisation of nomenclature for this study.

Lest we should anticipate his later career too soon, it should be recorded that Krishnaswami was the first official Prehistorian of the Government of India, consequent on the specific recommendation in his Report by Sir Leonard Wolley, the celebrated Sumerian Archaeologist, for promotion of prehistoric studies by the Archaeological Survey of India in 1944, and the assumption of the office of the Director General of Archaeology in India, by Dr. (now Sir) R. E. M. Wheeler, for initiation of the reorganisation of the field programmes of the Survey. Working from Madras, it was then that the Stone Age and Megalithic studies were popularised by Krishnaswami and resulted in such comprehensive papers by him as 'Stone Age India' published in *Ancient India*, No. 3. His later enlargement of the megalithic studies in south India, as narrated earlier, were found summarised in his paper on the 'Megalithic types of India' published in *Ancient India*, No. 5. His sectional Presidential address to the Indian Science Congress meet at Delhi in 1958 on the 'Neolithic Pattern in India' stands out the most provocative and immaculate presentation of a difficult thesis, with a rare synthesisation of regional milieu.

In the Archaeological Survey of India, where he held successively the posts of Superintendent in various Circles and Dy. Director General (Explorations), he had organised and assisted in many field projects and trained a host of young scholars. The Fort Museum at Madras is a testimony to his powers of organisation and action, at the opportune moment. On his retirement from the Survey, he was invited by the authorities of the Indian Museum, Calcutta, to function as its Director, and later he held the Directorship of Salar Jung National Museum, Hyderabad. At the very time

of his sudden demise, he was slated for the Directorship of another important Science and Art Museum at Hyderabad.

A man with a perennial fund of a somewhat wry humour and an infectious gusto, liable to be occasionally interrupted by wild outbursts that left him remorseful only too soon, his was a colourful personality by any standards. Through his original and pioneering early field research in the prehistory of south India, he had most deservedly written himself into the annals of these studies, as one of its esteemed savants.

In a commemorative context such as the present one, it would be pardonable to present the foibles as well as the flairs of the person under study and no colourful figure was ever without being controversial either, and 'V. D. K.'—as he was familiarly abbreviated by all his Indian colleagues—had these traits in abundant measure. There was an aura of a permanent campaigner about him, and while he did not collect any court around him as some of the less well endowed bureaucrats are apt to, he did keep a crack personal squad for launching invisible action, when called for, and certainly in scouting talent of miscellaneous kinds for all contingencies, minor or major, among his friends, colleagues and subordinates, he was unrivalled. It was indeed fascinating to watch him in the midst of his performance. He always plumped for the strategic rather than the tactical, and kept his machinery well oiled. His roving eye always unerringly caught, whether in an advertisement of merchandise or in a research paper, the data that is most striking and useful, and he made careful note of these for further utilisation by him or his colleagues. His tours were marathon affairs—typical of his age—with the commissariat given extra attention; for, though personally he was far from being a gourmet, he was nevertheless, a discerning gastronomist, and one who dispensed the day with one square meal when necessary, but with unspecified rounds of snacks, where available.

There were many apocryphal stories about him, some of which he himself narrated with gusto, for he had a knack of turning even permanent enemies into temporary friends. At the behest of Wheeler, at Brahmagiri he once literally jumped into the trench to show his alertness and all but broke his ankle. He was a window-dresser *par excellence* and one who kept his humour intact, even when his luck and status were at the lowest ebb, so that when the brighter day dawned, he could remain unscathed. His own personality underwent psychosomatic changes, with the passing years, and even his close colleagues were sometimes flabbergasted by his atrocious changes of apparel, including a long saffron robe, wooden sandals and a swirling walking stick, and he had once well nigh dismayed and confounded some of his own close kinfolk, by masquerading in false moustaches and beard and being close at hand but undiscovered at an airport on arrival.

While, his acumen and wordly wisdom of an unabashed kind made him a picturesque colleague, his keen analytical powers had also led him into the realms of the occult and clairvoyance and, as a matter of fact, he was an intuitive palmist who delved with assiduity into the available literature and empirical palmistry studies.

Tagore had said that 'without making the pilgrimage, you cannot reach the shrine'. V. D. K. did make his ardent and arduous pilgrimage. Could he reach the shrine ? Only the Almighty, in whose bosom he now rests, would know the answer.

—*K. V. Soundara Rajan*

PERHAPS THE EARLIEST PLOUGHED FIELD SO FAR EXCAVATED ANYWHERE IN THE WORLD

B. B. LAL

The Archaeological Survey of India, under the joint direction of the present writer and his colleague, Shri B. K. Thapar, has just completed its excavations at Kalibangan in District Ganganagar, Rajasthan, a site now well known for the remains of the Indus Civilization.

Situated on the left bank of the Ghaggar river, which has dried up since the ancient times, the Indus settlement is divisible into two parts which, following the pattern of Harappa and Mohenjo-daro, comprise a 'citadel' on the west and a 'lower town' on the east.

However, what is more important about the excavations at Kalibangan is the discovery of a settlement which even preceded that of the Indus Civilization (also known as the Harappa Culture, after the name of the place where it was first identified). Thus, below the Harappan 'citadel' have been found the remains of a small township which represents a culture different from the mature Harappa Culture, yet which may have contributed to the make-up of the latter in some ways. This pre-Harappan township was itself fortified and, indeed, as the excavations revealed, the Harappans utilized the pre-Harrappan town-wall by incorporating its northern and western sides into their own citadel-wall.

These pre-Harappan people enjoyed a fairly advanced material culture though, no doubt, it was not so much advanced as the Harappa Culture itself. They lived in well-planned mud-brick houses as did their successors, used well-fired red pottery, often slipped and painted with nice geometric floral and faunal designs, had overground as well as underground ovens (resembling the modern *tandurs*) for cooking, domesticated the cattle, carried on agriculture and used, besides blades and arrowheads of chalcedony, jasper, etc., copper implements to meet their every-day needs. Amongst the major items that stand out in contrast between the equipment of the pre-Harappan and the Harappan people are seals and sealings and weights and measures, used by the latter. One does not know as to what impelled human beings, to originate writing,

but if it be commerce and trade, as is not unlikely, the pre-Harappan people of Kalibangan perhaps had yet to grow their wings.

Be that as it may. The pre-Harappans of Kalibangan have given us a unique example of a ploughed field. To the south-east of their settlement, well away from their town-wall, have been discovered the remains of an agricultural field having furrow-marks on a grid pattern (plates I and II). The two sets of marks run at right angles to each other and approximately north-south and east-west respectively. The average distance between the individual furrows of the former set is 1·90 metres, while in the latter case it is 30 centimetres. It was also observed that the north-south furrows with greater intermediary spacing overran the east-west ones with shorter spacing (cf. plates I and II). This shows that the short-space ones were ploughed first, and then the ones having greater spacing in between

As these marks began to appear on the ground during the course of excavation, discussions as to their probable purpose also commenced. Thus, when at the initial stage only a few short-space lines were observed it was thought that these might represent the impressions of some wooden construction which fell on the ground and got decomposed, although it was also felt that these might be furrows of an ancient field. Within a few days came to be exposed the lines running at right angles to the former. The wood-impression interpretation began to lose ground, although it was still argued by a few that the cross-lines might represent cross-bars used in the construction. In the course of time when a sizable area (about 4×4 m.) of these grid-pattern lines was exposed, the wood-structure theory began to recede to the background, and the furrow-theory gained ground. (Finally, the furrow-marks were traced in an area measuring about 14×10 metres.) However, it was difficult to explain fully the grid-pattern of the furrows. A survey of the fields around Kalibangan was then undertaken, and it was a most pleasant surprise to find that amongst the various patterns followed in the region was also one which tallied with that excavated. It even agreed in certain essential details. Thus, on plate III may be seen a modern field which shows not merely a grid-pattern of furrows but also that in one set the intermediary space between the furrows is much greater than in the other. Also, the superimposition of the furrows shows that the set with greater spacing has been ploughed later than the other one. This is exactly what had happened in the case of the excavated field.

While the similarity of the ploughing pattern confirmed the idea that the excavated lines represented an ancient field, the question that still remaind to be answered was: why such a pattern ? Further enquiries were made which revealed that this pattern was adopted to accommodate two kinds of crops in one field. Later on, it was observed that in the furrows with short intermediary

Plate I : Kalibangan, Pre-Harappan ploughed field, (See page 2)

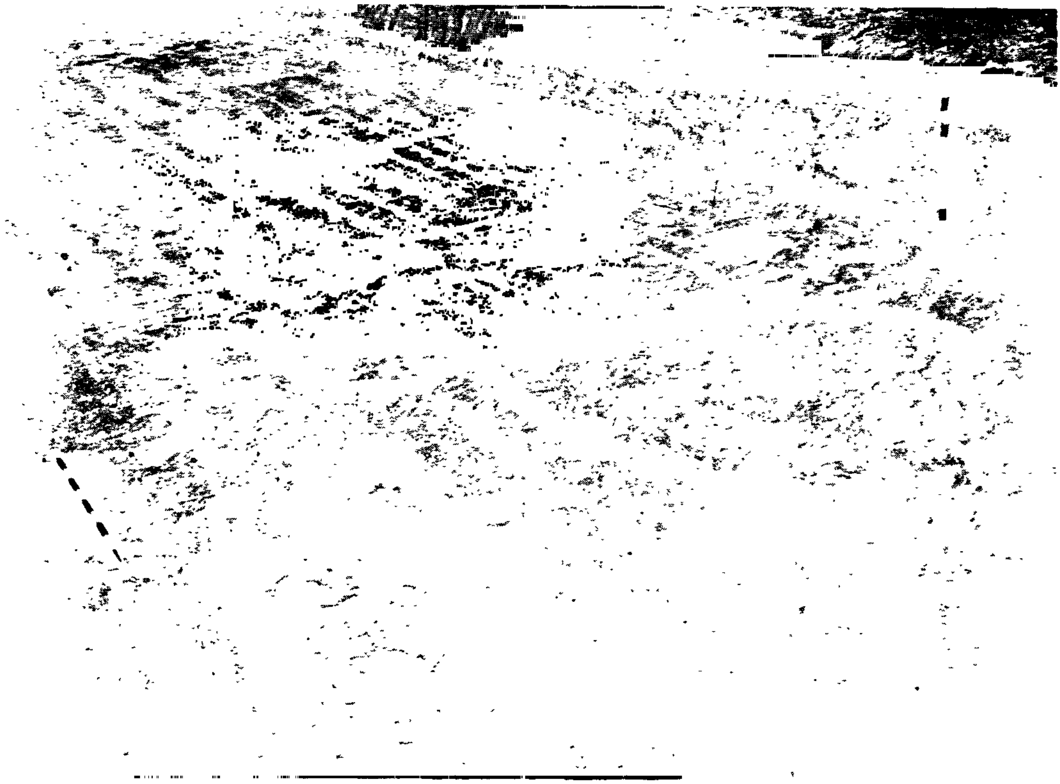

Plate II : Kalibangan, ploughed field on grid pattern, another view, See page 2)

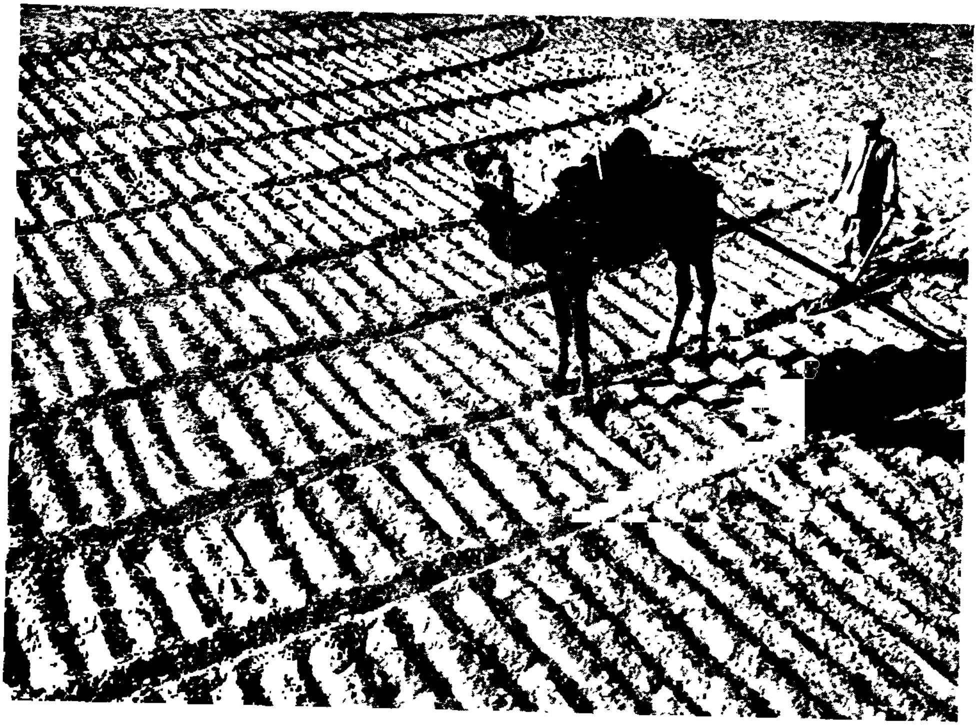

Plate III. Kalibangan, modern ploughed field on grid pattern with horizontal and vertical furrows, *(See page 3)*

Plate IV : Kalibangan, modern field with mustard and horse-gram plants in horizontal and vertical rows respectively, *(See page 3)*

space were sown horse-grams,while in the ones having greater spacing, it was the mustard plants (plate IV). The reason for such an arrangement also became clear: while the plant of the horse-gram is a short one, that of the mustard is tall and spreads out much more.

That the excavated field belonged to pre-Harappan times was amply clear. It was overlain by a layer of silt over which ran layers yielding typical Harappan material. These latter layers were also connected with Harappan structures close by (cf. plate I). In another part of the trench, the furrows were disturbed by clay enclosures and ash-pit carrying Harappan material (plate II). There was, therefore, little doubt about the stratigraphical position of the field. Carbon-14 determinations show a date between 2450 and 2300 B. C. for the pre-Harappan levels at Kalibangan. However, experts apprehend that the Carbon-14 dates for the second and third millennia B. C. may be younger by a few centuries. If that be so, the Kalibangan field may broadly be placed in the first half of the third millennium B. C.

As far as the present writer is aware, this is the earliest agricultural field so far excavated anywhere in the world.

GULF OF OMAN : THE ORIGINAL HOME OF INDIAN MEGALITHS

S. P. GUPTA

THE PROBLEM

The problem of the original home of the Indian megaliths has long been baffling the scholars. This is so in spite of the fact that most of the evidences point to their original home beyond the western borders of Afghanistan. The reasons for this difficult situation are primarily three:

(i) The typology of the megalithic monuments in India, as well as in the western countries, is extremely varied, so much so that we do not get all of the types at a single site or even in a single geographical or political zone; in fact, in every country there are several local types.[1] (ii) The grave-offerings in the megaliths outside India are also varied and we do not get in any country the repertoire similar to that found in India, although the parallelism of individual objects have been noticed in areas from Yemen to the Aral Sea and beyond.[2] In fact, each country has its own culture-complex associated with its megaliths. (iii) During the last two or three decades, most of the Western writers, and following them the Indians, have confined themselves to the consideration of those megalithic sites which are chronologically bracketed between 3000 B. C. and 1500 B. C. Obviously, these sites were either of the Neolithic period or of the Bronze Age.[3] Since the Indian megaliths belong to the Iron Age, the beginning of which was placed by Wheeler in the Achaemenian period,[4] a gap of thousand and odd years was repeatedly stressed by these writers. Obviously, the solution was nowhere in sight.

In the meantime another thread was picked up by Gordon who hinted at the possible relations between the southern Arabian cairn-burials and Baluchistan cairn-burials of the Iron Age.[5] This view was reiterated by the present writer;[6] it was, however, not accepted by some scholars including Banerjee,[7] who connected the Baluchi cairns with the Indian megaliths generically.[8] At the same time Heine-Geldern connected the Baluchi cairns with the Caucasian megaliths and the stone slabed graves of Tepe Sialk.[9] Recently, Leshnik has elaborated the Central Asian theory.[10] What is important to remember is that while Wheeler, Childe, Haimendorf,[11] etc., did not at all consider the Baluchi cairns as a link with the megalithic monuments of India, Banerjee,

Heine-Geldern and Leshnik looked upon them as the immediate source for the Indian megaliths, including those in south India.

A SUGGESTION

It is, however, difficult to believe that the Baluchi cairns or the Central Asian cists or cairns or barrows gave rise to the south Indian megalithic complex. On the other hand, it is strongly felt that the Baluchi cairns were generically related to the south Arabian cairns of the Iron Age. Of late, it has also been felt that the areas around the Persian Gulf or the Gulf of Oman may provide the key to the problem relating to the origin of the Indian megaliths. Belonging to the early Iron Age of the first millennium B. C., we have in that region, besides cairn burials, several types of sepulchral monuments,[12] the plans and the construction of which are reflected in the Indian peninsular megaliths whose traditions go back to the early Ist millennium B. C. Thus, south-eastern Arabia, with its outlet in the Gulf of Oman, may be taken as the epicentre of the Baluchi cairns as also the peninsular Indian megaliths. It was in the Islands in the Gulf of Oman that several traditions from Palestine, Mesopotamia, southern Arabia etc., came, mostly along with traders, and got fused; the graves discovered in south Arabian sites have actually yielded items from these regions. Thus, through the natural outlet of the Gulf of Oman, the people seems to have moved out eastward following the traditional sea-route along the Makran coast. Following Glyn Daniel's[13] theory that in their diffusion the megalith builders often followed the same route repeatedly, over a long period of time, we would like to suggest that at one time, along the Makaran route, the megalithic tradition travelled up to the Western Ghats of India and at another time the cairn-burial tradition travelled to Baluchi Makran, and Sind, may be up to Kutch and Saurashtra, along the same route. In both the movements, the traditions moved into the hinterland, from the south to the north. We do not visualize the voyage across the high seas from the gulf to the Western Ghats, although its possibility cannot completely be ruled out. While moving in the interior of different regions, these people seem to have come into contact with the local people, as also others who themselves might have been coming from elsewhere. Thus, we may visualize the possibility of the Baluchi cairn builders occasionally coming into contact with the West Asian and Central Asian peoples and borrowing from them certain material items and spiritual ideas. Similarly, we can also visualize hybridization of the original ideas with those locally prevalent ones, leading to the new modified forms of the sepulchral monuments as also the mode of the disposal of the dead. However, *we do not have sufficient evidence as yet to connect the Baluchi cairns with either the Vindhyan or the peninsular (Indian) cairns generically,* although, as Wheeler says, 'ideas have wings' and they might have travelled into these lands in a casual way which is beyond our comprehension.

With this much of theoretical background regarding our theory, we come to the actual archaeological evidence in southern Arabia and Persian Gulf islands.

DATA

The explorations and excavations in these regions have brought to light the following types of sepulchral monuments, all datable between 1000 B.C. and A.D. 100. These are cairns, cairn-circles, rock-cut caves, menhirs, barrows, triliths, tumuli, terracotta sarcophagi, cists, etc. Some of these monuments bear Himyaritic inscriptions going back to 1000 B. C.

CAIRNS, CAIRN-CIRCLES AND CAIRNS WITH MENHIRS

In southern Arabia, we come across several types of cairns, e.g., round, oval, square and rectangular. Along the southern shores, at sites like Ras Resut, the "larger ones measured 6 to 12 metres in diameter and reached a height of about two-thirds of a metre above plain. Around the larger graves were smaller ones looped to their circumference".[14] The cairns, in a large number of examples, were 'cairn-circles', i.e., they were surrounded by either a single chain or double concentric chains of big boulders. It is important to note that in areas like the Hajar province of Hadhramaut a cairn is marked by a free standing menhir in its centre.[15]

It is significant to mention that many of these types of cairns are found in Iran and India; round and oval types have been reported from southern Iran, Baluchistan,[16] Gujarat,[17] the Vindhyas[18] and the whole of the peninsula;[19] square and rectangular cairns have been located in southern Iran,[20] and Sind,[21] and the Vindhyas;[22] and the cairns with menhirs have been discovered in Madhya Pradesh.[23]

ROCK-CUT CAVES AND BLACK-AND-RED WARE

In Hadhramaut, Aden Protectorate, on Wadi 'Amd, opposite town Hureidha, there are a number of rock-out tombs in the scree-slopes of the valley cliffs. Two of these graves—A5 and A6—have been excavated by Caton Thompson. They turned out to be round chambers with rock-cut benches along the cave walls. Tomb A5 yielded the skeletal remains of 42 individuals and a large quantity of grave-goods, kept in small groups over the floor as well as on the benches. The offerings consisted of 87 earthen pots, several beads, and a number of bronze and iron-bronze objects.[24] A6 yielded the bones of three persons, beads, earthen pots, a pair of seals, etc.[25] According to the excavator, following the opinion of Beck, the beads are of Eastern Mediterranean type of the 6th centrury B.C. and the seals are of the Achaemenian type.[26] Harding, on the other hand, dated the pottery to the 9th century B. C. He discovered similar pottery

at Adiat-al-Sultan, in Fastern Aden Protectorate. The same pottery was again found in the lowest levels of Hajar-bin-Humaid, dated to the 9th century B. C. by C-14 method.[27] It appears, therefore, that the graves belong to the Ist half of the Ist millennium B. C. In connection with the offerings Thompson has made another significant observation; "···caravan or coastal traffic may have brought them (i.e., beads, seals, etc.) from the Persian Gulf."[28] Clearly, the Persian gulf was on the regular trade route between southern Arabia and the countries of Western Asia.

There has been another interesting discovery in the Hadhramaut Wadi at Mashgha. Here a big pot-sherd was found which was "red to black on the outside and black in."[29] The black-and-red ware might have come from Palestine.[30] In the Indian context it is associated with the cultures ranging from the Harappan period to the megalithic.[31] It may not be out of place to mention that Egypt had this ware at the grave sites of Tumas, etc., of the 2nd millennium B.C., i.e., in the porotohistoric times,[32] and Palestine might have got it from there. This Egyptian black-and-red ware of 'C' Group people of 2000-1000 B.C. also moved in Ethiopia[33] and it is equally possible that South Arabia got it from this country which was quite near. Although, I am not in a position to suggest that India learnt the technique of producing black-and-red ware from Egypt, or Ethiopia or southern Arabia, yet, as Sri B.B. Lal has very pertinently pointed out to me, in a personal discussion with him, that it may not be without significance that the black-and-red ware is found confined to a rather homogeneous land curve that may start from Egypt and fall in south India; it is not found in any other region of the ancient world.

In connection with plain pottery Allchin may be quoted: "Legged urns identical to Indian types are reported from the Yemen."[34]

In the Jebel Sot region, D. van der Meulen has made two important discoveries. One was a series of "well cut square columns of stone, about 1·2 metre high, and linked up two of these were flat stones set in a rectangle".[35] The other was a series of open rings of upright slabs.[36]

It may be pointed out that such menhirs have been reported from Asota in Baluchistan to the central regions of Kerala,[37] and slightly similar table stones have been brought to light in the tribal belt in eastern India.[38] The 'open rings of upright slabs' remind us of the 'Hood Stones' from Kerala.[39] It may, however, be made clear that the east Indian 'Table Stones' are likely to have been related with the south-east Asian complex and not the Western complex since the prehistoric cultures of eastern India had always the south-east Asian bias.

TERRACOTTA SARCOPHAGIUS

Terracotta sarcophagi, sometimes with anthropomorphic lids (e.g., at Sankar-varam) and sometimes without legs (e.g., at Maski) have been reported inside and outside the megaliths from Kerala to Madras. Since such pottery coffins were not in use in India in the pre-Megalithic context, it has repeatedly been suggested that it came from Western Asia: in Mesopotamia it was in use from 3000 B.C. (at Baghadad[40] several oblong and short legged sarcophagi were found); in Palestine its use has been attested to even in the Iron Age (at Beth Shan and other places they are dated to 1200 B.C.); in Egypt its tradition goes back to the chalcolithic times, but it is important to note that Canaanites used them even in 900 B.C.[41] It may here be pointed out that this tradition was alive even in the Persian Gulf round about 900 B.C. Glob excavated one such sarcophagus in the Bahrain island. It belonged to the Neo-Babylonian times and it yielded three arrowheads and one dagger of iron, seven rings of copper, a seal stone, etc.[42]

TRILITHS OR 'TOPI-KALS' (?)

In northern Jol, Meulen has reported another interesting discovery, that of a 'trilith'. It "consisted of three long stones, about a metre high, standing on end and leaning towards each other. Sometimes a trilith had a fourth small stone on top. Occasionally, a series of triliths was enclosed with an elliptical line of pebbles."[43] In the interior of Oman, Thesiger has reported a number of triliths and tumuli in some sites on the banks of Ithli, in wadi 'Amairi, near the western end of Jebel Salakh and Andam.[44]

A trilith is not identical with a *'topi-kal'*, which has four stones, but those with cap-stones and stone-circles might have inspired the form of a *topi-kal.*

CISTS AND JAR BURIALS

In the island of Qatar, Glob explored a cemetery of about 50 cairns usually measuring ten metres in diameter and one metre in height. He opened one of these cairns and found "a stone cist with roofing slabs, surrounded by smaller boulders. The cist lay in a north-south direction and was cut down into bed-rock".[45] It measured 1·9 metres in length. The monument seems to belong to the middle of the 2nd millennium B.C., i.e., the latest phase of the chalcolithic culture of the island.

Interestingly enough, on a rock nearby, hundreds of 'cup-marks' were found. According to the excavator they 'undoubtedly represent the female sexual character-

istic'.[46] While interpreting the cup-marks on the circle-stones of Junapani, Rivet-Carnac compared them with the Morse code.[47] Such cists, cairns and cup-marks are known to us from the Vindhyas to the Deccan.

It may also be mentioned that at places like Ras Abaruk and Mezru'ah in the island the graves continued to be erected till the 3rd century B. C. They have yielded iron swords and arrowheads, glass objects, pot-sherds of the early Seleucid period, etc.[48]

In the Bahrain island, along the north coast and outside the extensive Bronze Age cemeteries, there are a large number of cairns and barrows of the Iron Age. Tumulus no. 36/2 is their typical example. It was oriented east-west and it contained the secondary remains of an adult and a child along with a silver bracelet, iron dagger and knife.[49]

At Ras-al Matbakh a large jar burial has also been reported.[50]

Allchin writes: "Stone-cist graves, with or without port-holes, are found in the Levant and on the coasts of Arabia."[51]

SOME TOPOGRAPHICAL OBSERVATIONS

About the topographical setting of the megalithic cemeteries in south Arabia Philby has made some very significant observations since most of them are equally applicable to the setting of Indian megalithic grave-yards. He writes: "the evidence of more plentiful water in these parts in ancient times argues the presence of a large agricultural and pastoral community in the vicinity of the cemeteries those days, while the analogy of Kharj province accounts for the burials on higher ground away from the habitation ...I would offer a suggestion that in them we have a link with the Phoenicians of old."[52]

The south Indian megalithic sites are also generally found situated near tanks and on a higher ground, away from the habitation. Similarly, the types of iron tools from the graves also prove that the people were partly nomadic-pastoralists and partly agriculturists. However, we may or may not agree with the Phoenician theory of Philby.

THE CAMEL VIS-A-VIS THE HORSE IN MEGALITHS

In one of the south Arabian graves, excavators have discovered the fragmentary bones of the camel.[53] As against this in some of the Baluchi cairns[54] and Peninsular graves[55] fragmentary bones of the horse have been found. Naturally, the question may

be raised that if southern Arabia had anything to do with either the Baluchi cairn burials or the peninsular megaliths, why do we not get the camel bones in them ? Further, how to account for the association of the horse with the cairn and the megalith builders ?

One may place any number of suggestions, alternatives and arguments in favour or against a theory in this regard, but one simple fact need not be forgotten: the two animals have their own habitats, each absolutely different from the other; the camel is a desert animal but not the horse. Obviously, the camel was of no use to most of the people in peninsular India. Moreover, it has repeatedly been pointed out by all the authors that by-and-large, the megalith builders, during the process of their diffusion, took with them what we now loosely call 'megalithism'—i.e., the plan and structure of the monument, the system of collective burial, etc.—and not the culture-complex. If the migration was coastal, which seems to be largely so in the case of megaliths, even the mount, and that too a camel, was not taken to the new region; generally it was hardly feasible. The migrating people adopted the culture-complex and the popular mount of the local people. Moreover, let it also not be forgotten that so far camel bone has been found only in a few graves in south Arabia and, therefore, is not of much statistical value. But then the other question is more significant. How to account for the association of the horse with the Indian megaliths and cairn burials ? One of the probable answers may be that the animal in question, both in Baluchistan[56] and in penisular India,[57] is likely to have existed prior to the newcomers. If so, the migrating people simply made greater use of this animal than hitherto. It is possible that the people were inspired to do it because of two reasons: firstly, their coming into contact with the Iranian and the Central Asian hordes while moving hinterland in Baluchistan, and secondly, the compelling necessities of a nomadic people on the march.

However, the existence of the domesticated horse in India prior to 1000 B. C., i.e., in the Harappan, Chalcolithic and Neolithic times, has as yet not been convincingly proved; at least the archaeological evidence quoted so far is far from conclusive.[58] On the other hand, the horse was certainly put into use by the people of Western and Central Asia much before this date.[59] This important evidence leads to two conclusions: firstly, at least a few groups of the cairn builders of Baluchistan as well as the megalith builders of peninsular India were in close contact with those adept in breeding the horse in captivity. These horse-breeders could be either Iranians or Central Asians. If they were Iranians, they could be from the Fars, as they could be from any other place. I am thinking of the province of Fars in south-eastern Iran because we have a number of cairn burial sites in that region. Secondly, at least one group of the megalith builders may also have migrated along the land-route although the evidence at present is slender.

What could be the land-route through which the horse came to India round about 1000 B.C. ? If it came through the Fars, it could have taken the southern route across southern Baluchistan, Sind, Gujarat and the peninsular region but if it came from northern Iran, i.e., from the region of Sialk, it could have entered into the Zhob valley, Swat Valley, Indo-Gangetic plains and the peninsular regions. But such routes are only broadly so; when the diffusion of an important item like the domestication of the horse takes place its movement is more radial than unidirectional. It means, once it came to Baluchistan at any particular place soon it diffused in all directions, covering practically the whole of Baluchistan in a short time. Similarly, when it entered the Indo-Gangetic plains it was diffus d in all directions quickly. As a matter of fact, it is likely to have entered into these plains from several points in the north as well as in the south. Since the diffusion of the horse must have been the 'Trait Diffusion', i.e., accompanied or unaccompanied by items of material culture, it is not possible at the present state of our knowledge to work out the diffusion of the horse in the context of a particular culture-complex and a particular route.

The megalith-builders, travelling along the Makran coast (which does not mean that they were always in the boats), could have acquired the knowledge of domesticating the horse anywhere in southern Iran; of course, in the present state of research 'where' and 'how' this knowledge was acquired cannot be answered.

This discussion is based on the popularly held assumption that the horse came to India from western Asia. But it should not be forgotten that Arabia has always been famous for the good breed of the horse. But how early it appeared in south-east Arabia is not known although by about 1700 B.C., or slightly later, the horse was known to the Kassites in Babylonia and Syria, the Mitannis on the upper Euphrates, the Hittites in Asia Minor, the Amorite principalities of Palestine and the New Kingdom of Egypt. Zeuner, however, feels that it came to India with the Aryans in the middle of the 2nd millennium B.C. from northern Iran.[60] If it is so, the Megalithic folk were not responsible for introducing the horse in India. But Zeuner's theory is based upon linguistic evidence alone; archaeological evidence does not take back the horse in India prior to 1000 B.C. The introduction of the horse seems to be coeval of the introduction of iron.

STONE CISTS IN SAUDI ARABIA

The Danish expedition of 1964 also explored limited area in Saudi Arabia. In the small island of Tarut, about two miles from the town of the same name, Glob and Bibby discovered several stone cists and "around these, and on the surface of the

mounds, lay quantities of fragments of alabaster and steatite vessels apparently of first millennium B.C."[61]

CAIRNS WITH PORT-HOLED SLABS IN OMAN PENINSULA

Danish archaeological expeditions in the Oman peninsula have explored a number of round mounds with port-holed and plain megalithic graves of the Bahrain cairn type surrounded by stone-circles of the period between the third millennium B.C. and thirteenth century B.C. The type site is located between villages Hili and Qatara on the northern edge of the Buraimi Oasis which lies about 200 km. hinterland from Abu Dhabi. The corresponding habitation site is securely dated to the period between the 3rd millennium B.C. and 12th century B.C.[62] In the region between Al-'Ain and Jebel Hafit several cairns and tumuli were excavated, some of which have been dated to the 13th-14th centuries B.C. on the basis of a Luristan type bronze sword.[63] It may, therefore, be reasonably presumed that in the Oman peninsula the megalith builders might have lived up to about 1200-1000 B.C. (C-14 date : SM 1113=3196±156 B.P.) It is possible, though not Proved, that around 1000 B.C. these people, along with others, living in Aden Protectorate as well as round the Gulf of Oman and the Persian gulf, slowly moved out towards the east along the Makran Coast. Halting and marching, imbibing many new elements and leaving behind several old ones, yet holding fast to the practice of megalithism, they reached the Western Ghats of India.

CONCLUSION

The above quoted evidences are based upon the extremely limited explorations and excavations conducted in southern Arabia so far; more work will certainly throw fresh light on the problem. In this short space I have tried to put at one place some of the relevant factual data known uptil now. They are fragmentary and expanding. They hardly convey any unified story; what we do not know is much more than what we know. Any one can see that the similarities shown above are extremely distant; there is not a single example where we may have an exact prototype of the Indian megaliths. The caves in the Hadhramaut Valley are round and with rock-cut benches, but they have neither the central pillar nor the central opening, nor the vertical and side entrances, nor the antechambers, etc., of the Indian rock-cut caves of Kerala. The sarcophagi in Baghdad, etc., are hardly so much elaborate with a large number of elephantine legs with holes, vaulted lids, etc., as they are in India. The 'triliths' in south Arabia is much different from the 'topi-kals' of Kerala. The Bronze Age cairns with portals are also not the typical port-holed cists of south India because the former has several arterial galleries within its construction. The black-and-red ware in south Arabia is so far

represented by only one example.

Almost similar is the case with the Iranian, Palestinian and Central Asian examples quoted by a few authors. The so called port-holed cists of Sialk are long corbelled structures and not box like structures of the Indian types. The Palestinian examples are so much removed in time and space that they could not be the immediate source of origin for the south Indian megaliths. In typology also a number of examples of the Palestinian group do not find place in India, e.g , double-storeyed cists. The Central Asian examples of cairns, circles and mounds are also far removed in the richness of typology from the south Indian typology.

Obviously, one may ask for the grounds on which we correlate the Arabian and Indian examples. To us, they are only of the generalized kind: use of big stones, shapes of the receptacles of skeletal remains, presence of portals, ground-plan of the monuments, black-and-red ware, etc. Long back, Gordon Childe had also pointed out to these generalized similarities [64] However, *our deductions are extremely tentative* which may be discarded if something positively comes to light against it. But for the present, to us, the evidences appear extremely tempting in favour of the Gulf of Oman theory which seeks the origin of Indian megaliths is southern-eastern Arabia.

NOTES

1. Krishnaswami, V. D., "Megalithic Types of South India" *Ancient India* (hereafter abbreviated as *AI*), no. 5 (1949) , pp., 35-45; Daniel, Glyn, *The Idea of Prehistory* (Pelican books, Harmondsworth, 1964) ; Childe, V. Gordon, "Megaliths", *AI*, no. 4 (1947), pp. 4-13.

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14. Bowen (1958), *op. cit.*, pp. 134-35. Also see, *Journal of the Bombay Branch of the Royal Asiatic Society*, vol. III, pts. I and II (1847-1856), pp. 262-63.

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19. Aiyappan, A., "The Megalithic Culture of South India,," *Indian Science Congress Association*, vol. XXXII (1945), Presidental Address.

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Sari-i-Asiab, Fanuch, Tump-i-Gabraha, etc.

21. Raikes, R., *Archaealogical Explorations in Southern Jhalawan and Las Bela*, (Rome, 1968), pp. 156 ff. The sites are Jeman Goth, Kanar, etc.

22. Singh, P., "Megalithic Remains in the Aravalis", *uratattva*, vol. 2 (1968-69), pp. 46-48. See also, G. R. Sharma, *IAR-1962-63*, p. 41; *IAR-1963-64*, p. 57. The important sites are, Satmas, Dausa, Kotia, etc.

23. Deo, S. B., "Megaliths in Maharashtra", *SPPMI* (1969), pp. 27-36. Dhanora is the typical site for such monuments. *IAR-1956-57*, p. 35.

24. Caton Thompson, G., *The Tombs and Moon Temples of Hureidha (Hadhramaut), South Arabia* (London, 1944), p. 65. See also, F. Stark, "An Exploration in the Hadhramaut and Journey to the coast", *GJ*, no. 93 (1939), pp. 7 ff.

25. *Ibid.*, p. 103.

26. *Ibid.*

27. Harding, G. L., *Archaeology in the Aden Protectorates*, (London, 1964), p. 31.

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30. I have personally seen a few black-and-red ware sherds in the University museum of Jerusalem (Israel) in 1963. I was told that they belong to late chalcolithic period of Israel, but none could tell me anything about the site from which they came.

31. Lal, B. B., "From the Megalithic to the Harappa: tracing back the graffiti on the pottery", *Ancient India*, no. 16 (1960), pp. 4-24.

32. Lal, B. B., *Indian Arhaeological Expedition to Qasr Ibrim, Nubia, 1962* (Cairo, 1967), Published by the Department of Antiquities of Egypt. On page 117 he writes: "Again, it is probable, though not proved that there may be some link between the C–Group culture of Nubia and Megalithic south." Black-and-red ware, also called as black topped ware, has been found in Egypt from 4000 B. C. onwards (e. g., at Naqda). See also, *IAR-1961-62*, pp. 66-70.

33. Dikshit, K. N., "On Origin and Distribution of Megaliths in India," *SPPMI*, p. 10. He quotes Dr. H. Straube of the Inst. of Ethnography, Cologne, for this information. Straube has himself explored this pottery in Ethiopia. See also, Azais, R. P. and Chambrd, R., *Cinq Anneis des Rcheres Archaeologius en Ethopie*, (Paris, 1931). Quoted by Dikshit.

34. Allchin, B. & R., *The Birth of Indian Civilization*, p. 230.

35. Meulen, D. Van der, "Aden to Hadhramaut and Journey to the Coast", *GJ*, 93 (1939), pp. 122-23. See also, Bowen (1958) *op. cit.*, pp. 134-35.

36. *Ibid.*

37. Gordon, *op. cit.*, p. 183.

38. Haimendorf, C. von E., "Megalithic ritual among the Gadabas and Bondos of Orissa", *Journal of the Asiatic Society of Bengal* (abbreviated *JASB*), vol. IX (1943), pp. 149-87.

39. Krishnaswami (1949), *op cit.*, p. 40.

40. Jones, I. N. and Hall, J., *Jr. Bom. Branch of Royal Asiatic Society*, vol. IV (1853), p. 378.

41. See for details, Dikshit, *op. cit.*

42. Glob, P. V., "A Neo-Babylonian Burial from Bahrain's Prehistoric Capital", *Kuml* (1956), fig. 5.

43. Bowen (1958), *op. cit.*, p. 135.

44. *Ibid*; see also, B. Thomas, *Arabia Felix* (London, 1932), p. 126; See also, W. Thesiger, "Desert Borderlands of Cman", *GJ*, no. 116 (1950), p. 153.

45. Glob, P. V., "Prehistoric Discoveries in Qatar", *Kuml* (1957), p. 177.

46. *Ibid.*

47. Rivet-Carnac, J. H., "Prehistoric Remains in Central India", *JASB*, 1879, vol. XLVIII, pp. 1-16.

48. Madsen, H. J., "Arabian Gulf Archaeolgy", *Kuml* (1964), p, 104.

49. Bibby, T. G., "Five among Bahrain's Hundred Thousand Grave-mounds", *Kuml* (1954), 139.

50. Madsen (1964), *op. cit.*

51. Allchin, *op. cit.*, p. 230.

52. Philby, J. B., *Sheba's Daughters* (London, 1939).

53. *Ibid.*

54. Stein, Aurel, "An Archaeological Tour of Gedrosia," *Memoirs of the Archaeological Survey of India*, no. 43, p. 88. In two of the hundreds of cairns at Gatti, the excavator found the skulls of the horse.

55. *IAR-1961-62*, p. 33; the horse's bones were found in a cairn circle at Junapani, near Nagpur. They were also found in a similar context at Khapa, near Nagpur. See, S. B. Deo, *Excavations at Takalghat and Khapa* (Nagpur, 1970), pp. 9 and 60-61. At Hallur, Nagarajarao found them in the Megalithic-Neolithic overlap levels of about 1000 B. C. (Allchin, 1968, *op. cit.*, p. 165).

56. Piggot, Stuart, *Prehistoric India* (Pelican books, Harmondsworth, 1952),

p. 121. Four teeth of the domestic horse (*Equus caballus*) were found in the lowest levels of Rana Ghundai (RG I). Piggot writes: "Nomadic, horse-riding herdsmen using the site as a camping-ground are suggested by the finds in RG I; an infant's skeleton was also found buried at this level." Zeuner, of course, feels that these teeth may be of hemiones (half-ass).

Horse skulls were found in two of the Iron Age Cairn burials of Zangian. On the contemporary Londo Ware pots, from sites like Shami Damb, Gushanak, Bit Damb of Bhagawana, Londo, the horse and horse with a rider (at Gushanak) have been found depicted in painted designs.

57. From the upper levels of Mohenjodaro the horse's bones have been reported. From Lothal, as also one from Mohenjodaro, a terracotta figurine has been identified as the representation of the horse. Zeuner feels that the animal may be onegar, i.e.. wild ass, still found in Gujarat.

58. Allchin (1968), *op. cit.*, p. 260. By 1700 B. C. the animal was widely in use in this part of the world.

59. *Ibid.*, p. 144.

60. Zeuner, F. E., *A History of Domesticated Animals* (London, 1963), pp. 318, 332-3.

61. *Kuml, 1965, p.* 150.

62. Karen Frifelt, "Archaeological investigations in the Oman peninsula, A preliminary report", *Kuml*, *1968*, pp. 170-75. The following passages are relevant to our present study:

"At a time when we in Denmark were building dolmens and passage graves, while Egypt was raising its pyramids, the Oman peninsula, too, had its megalithic graves." [p 170]

"Close to the monumental tomb [the one Frifelt excavated in village Hili, the round mound was 12 metres in diameter with 'colossally heavy and unwieldy stone blocks' (stones were generally smoothed on one side) forming a port-holed cairn] at the foot of the mountain of low mounds with potsherds and stone chippings on their tops, some with a single stone slab or so sticking up above the surface, most of them undoubtedly the remains of comparable tomb structures. Even 3-4 kms. to the north, almost buried in the sand dunes which stream in across the plain from the west, the

undoubted ruins of a plundered tomb were found." [p. 173]

The ancient habitational mound nearby yielded pottery, steatite pots, seals, etc., terracotta figurines and bronze arrowheads. The pottery (with black linear designs on fine red ware) from the deepest levels were comparable with those found in the Kulli culture of the 3rd millennium B.C. The same ware has also been recovered in the Bahrain island deposits of the same date, and Uman-an-Nar cairns in the island of Abu Dhabi. The same comparison exists in the associated terracotta animal figurines. However, the pottery as well as the parallel sided leaf shaped bronze arrowheads from the uppermost burnt (desertion) layers are comparable to those from the graves of Tepe Guran in Persia which are dated to the 13th century B.C. The date has been confirmed by two C-14 dates obtained on the charcoal samples from these layers: SM 1114=3403 $\pm$161 and SM1113=3196$\pm$156 B.P. [About Tepe Guran excavations, see Tharne in *Acta Archaeologica*, vol. XXXIV, p. 133]

See for more details, *Kuml, 1965*, pp. 149-50. *Kuml, 1966*, Fig. 1 on page 75, text on p. 94

63. *Kuml, 1964*, p. 109.

64. Childe, *AI*, no. 4, pp. 4-14.

For the views expressed in the 'conclusion' I am most thankful to my colleague Sri K. S. Ramchandran because in my long discussions with him I found he holds views entirely different from those I have expressed here. He feels that the megalith builders had a high sea journey from the Red Sea to the Western Ghats. I have, as the editor of this Bulletin, asked him to contribute a paper putting forward his views for a healthy and fruitful discussion.

Excavations at Chirand : New Light on the Indian Neolithic Culture-Complex

B. S. VERMA

The recent excavations at Chirand, District Saran, Bihar, have thrown a new light on the Indian neolithic cultures. For the first time, a full-fledged neolithic culture has been discovered in the Gangetic basin. Till about 1968, Chirand was known only for its chalcolithic culture, but in the recent dig, taken-up primarily for collecting samples for C-14 dating, a neolithic stratum of 3·5 m. thickness has also been discovered. The culture is known mainly by an impressive collection of bone tools and decorated pots.

BONE TOOLS

By now a fairly large area (in two different trenches, one measuring 10×10 m. and the other 10×15 m.) of the neolithic phase has been exposed. Among the important antiquities recovered are the bone and antler implements (plates I & II). They include different types of celts, scrapers, chisels (from large to small sizes), hammers, needles, points, borers, awls, diggers, a shaft-straightner (*baton-de-commandment*), pins, styli, arrow-heads (both tanged and socketed), and many unfinished implements, e.g., the shoulder bone of an ox which seems to have been used as a shovel. Such a large variety of bone and antler implements has so far not been reported from any other single site in India, excepting, of course, Burzahom where the tool-typology is basically different.

BONE ORNAMENTS

The neolithic people also made bone ornaments such as pendants, ear-rings, bangles, discs, and combs. Miniature bone replicas of neolithic stone axes were used as pendants and tortoise bone and ivory were used for preparing bangles. A reel-shaped object having horizontal perforations, is also remarkable. The people, therefore, seems to have mastered the technique of making all types of tools and ornaments of bone, even by drilling big hour-glass holes.

POLISHED STONE TOOLS

Four neolithic celts, besides many other ground implements, such as hammers, have also been discovered. Similarly, a number of other rectangular tools, pestles, querns, balls, etc., have been found. The rocks used for making these tools were quartzite, basalt and granite.

MICROLITHS

It is significant to note that the microlithic industry was an integral part of the neolithic culture of Chirand just as they were in south India. The tool types include micro parallel-sided blades, scrapers, arrow-heads, serrated points, notched blades, points, lunates, borers, etc. In addition, a few geometric microliths have also been discovered. The materials used for these tools are chalcedony, chert, agate, jasper, etc. A number of nodules and cores of these minerals were also discovered. *It is noteworthy that not a single blade has the crested-ridge.* The frequency of cores and nodules indicates that the microliths were locally manufactured. It may be presumed that the nodules were collected from the bed of the river Son which is not far away from Chirand ; just a few kilometres from the site in the south-east direction there is a place known as Haldi-chapra where the Ganga meets the Son. Pebbles of different types of stones are found in the sand of the Son and this may be the source of the raw material for the neolithic folk of Chirand.

BEADS

A good number of long tubular, long barrel, short barrel, cylindrical, triangular, disc-shaped beads of chalcedony, agate, jasper, marble, steatite and faience with an excellent finish were recovered from these excavations. Some of the beads were unfinished which indicates that they were locally manufactured.

TERRACOTTAS

Terracottas of humped bull, bird figurines, *naga* figurines (one is of the coiled variety), bangles, beads, punctured decorated objects (one shaped like a miniature *linga*, and the other like a barrel) and balls are very common. Two partially broken pieces of rectangular pendants with incised and punctured decorations are very interesting. One of them, with a hole in an applied knob in reverse for pinning, nicely resembles a modern brooch used by ladies. A small perforated stem, probably of a smoking pipe (traces of soot are found inside), is another significant object in terracotta. Some terracotta wheels have been also discovered. One wheel-shaped object (with-

out hole) with convex sides and flat edge was discovered from the habitation levels of this phase ; its exact purpose has, however, not yet been determined but it is likely to have been used as a dabber. A few terracotta discs with central holes, which were probably used as spindle-whorls, have also been discovered. Many burnt clay pieces (with finger impressions) in different sizes have also been found but their exact purpose is not at all clear. They are, however, somewhat parallel to the oval terracotta akesc from Kalibangan.

CERAMICS

The pottery of this period is, by and large, handmade, although a few examples might have been made by using the 'turn-table' method also. The bulk of the pottery is in red ware, although grey, black and black-and-red wares were also used. It is important to note that even in the neolithic time people knew the inverted firing technique to produce the black-and-red ware, but the pottery forms or types are quite different from the chalcolithic black-and-red ware pots and pans. A considerable number of pots had fine lustrous burnishing on the outer surface ; the inner surfaces being mostly rough and hard brushed. The people showed excellent advancement in ceramic techniques as the types included vase with broad mouth and narrow neck, spouted vase, bowl, lipped bowl, perforated bowl, footed bowl, oval bowl with broad lip, bowl-with-stand, begging bowl, footed cup, channel spout, miniature pot, spoon or laddle; a knobbed pottery was also made by them. A miniature hand-made dish in red ware, which has double perforations on its four cardinal points, like a toy balance used by children, has also been discovered. The neck portion of the vases was highly burnished while the bases were rusticated. Applied decoration on the neck portion of the vase was however, very common. This technique was developed to conceal the butting of the neck with the body of the vases. Post-firing scratch decoration was also done on some of the pots, such as a wheel with hub and sixteen spokes. On one of the sherds there is a mat impression which definitely proves that they knitted mat out of some kind of reed.

One of the interesting characteristic features of the pottery was the post-firing paintings in red ochre on grey ware, and rarely on red and black-and-red wares. Only the linear designs were common : criss-cross design in groups of five lines, concentric semi-circles, wavy lines, etc., have been found on the pot-sherds. On one sherd, there is a painting in dots representing a *trisula*. Rim based painting was equally popular (Fig. 1).

STRUCTURES

There is some indication that in the early phase people lived on floors prepared

below the ground, although they may have been roofed over. Later, we find them living on ground level floors with reed walls plastered with mud. A circular paved floor was discovered from the late phase of this period which was about four metres in diameter. A semi-circular hut was provided with several oblong ovens, probably for community cooking. It may be mentioned that outside this circular platform, post-holes were located at regular intervals. A fairly large number of burnt chunks of clay with reed or bamboo impressions have also been discovered from these strata, suggesting that the houses perished in some conflagration.

FOOD AND AGRICULTURE

It is apparent that rice was known to the people as paddy-husk impressions have been noticed on some burnt-clay pieces. It has further been confirmed by the discovery of a few examples of charred rice along with other charred cereals like wheat, *moong*, *masoor*, and barely. However, the people were not pure vegetarians as is evident from the discovery of a large number bones of animals, birds and fish, and clusters of fish-scales. The frequency of bone and lithic tools and weapons indirectly suggests that their main occupation was fishing and hunting. River shells and snails were also eaten by them since their remains have been found in great number. Opinion of the experts of the Zoological Survey of India on the remains of bones in the neolithic strata at Chirand has shown that the neolithic people had something to do with the elephant, rhinos, buffalo, ox, stag and deer, as the bones of these animals have been repeatedly found in different layers of the neolithic occupation.

CHRONOLOGY AND COMPARISONS

The Chirand neolithic complex, with its developed techniques in fabricating bone artefacts and beads, together with post-firing paintings in elaborate designs on pots, and highly burnished pottery, was certainly an advanced neolithic culture, perhaps without any knowledge and experience of metal working. Chirand is the only site in India which has yielded a neolithic deposit of more than three meters; at Brahmagiri, Tekkalkota, Pikhilhal and Utnur the deposits vary between one to two metres only. Although calculating date on the basis of depth alone is hazardous, yet some useful guesses can be made since the deposit consists of repeated sequence of ashy deposits. Available C-14 dates for the neolithic phase range from 1900 B.C to 1300 B.C. with the possibility of its beginning going back to about 2,000 B.C., if not earlier.

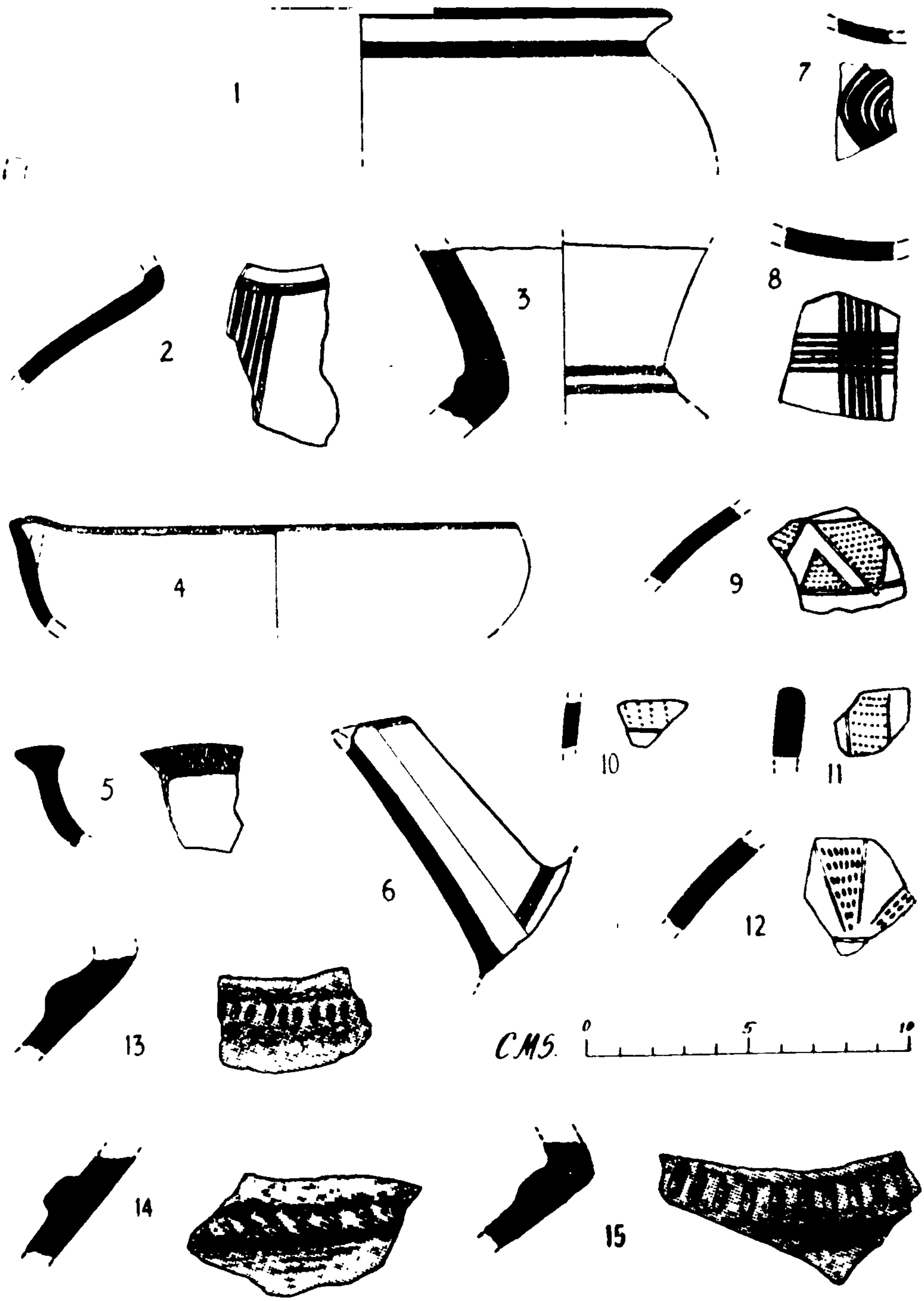

Fig. 1, Chirand, Neolithic plain and painted pottery

Some Aspects of the Chalcolithic Cultures of Central India

M. K. DHAVALIKAR

Consequent upon the discovery of the chalcolithic phase in the prehistory of central India, a large number of chalcolithic sites have been discovered in that area in the last two decades. Besides, some of these have also been excavated and, as a result, the cultural pattern of the 'Dark Age' is now gradually becoming clearer. Recent work in Madhya Pradesh has thrown a welcome light on the protohistoric cultures of Malwa stretching back the beginning of settled life before the beginning of the second millennium B. C. It was thus far held that the Malwa culture was the earliest that flourished in central India, but the new evidence affords conclusive proof of the existence of yet earlier cultures which not only preceded the well-defined Malwa culture but also probably contributed towards its making. Besides, some new aspects of the Malwa culture itself have been revealed by recent excavations. It is, therefore, proposed to examine the recent evidence on the chalcolithic cultures of central India.

Several aspects of the Malwa culture were brought to light by the large-scale excavations at Navda Toli by Sankalia and others in the fifties.[1] Subsequent explorations have amply established the distribution of this culture in time and space The culture, as is well known, is characterised by a painted black-on-red ceramic known as the Malwa ware. According to Sankalia, West Asian, more especially Iranian, influence is discernible in several pottery forms of the Malwa ware.[2] There should be little doubt about the extraneous influence, for many vessels have no parallels within the country. However, the channel-spouted bowl which is supposed to be a distinguishing feature of the Malwa ware does not appear to have been introduced from West Asia. It should be noted in this connexion that channel-spouted bowls have been recovered from several neolithic sites in the southern Deccan[3] and the available evidence shows that there is every possibility of their being copied by the Malwa culture folk. Moreover, this form of spout cannot be said to be a characteristic feature of the Malwa ware for the simple reason that it is absent at such Malwa culture sites as Kayatha, and even at Navda Toli it begins to occur in the third cultural phase of its occupation. The idea of a channel-spout thus appears at a later stage in the development of the Malwa

culture. Although Sankalia's[4] suggestion of its West Asiatic origin is plausible it can nevertheless be stated that vessels with channel-spout are not uncommon at neolithic sites in the southern Deccan. In fact a careful study of the pottery from such sites as Brahmagiri, Tekkalkota, Piklihal, Sangankallu, T. Narsipur, etc., shows that the channel-spout probably evolved from the lipped bowl through the short channel.

The recent excavations at Kayatha show that the Malwa ware can be classified into two distinct fabrics. The pottery so far found at sites like Navda Toli and others is rather thick in section and coarse in fabric; the core is usually unoxidized. The vessels in this ware are treated with a thick silp over which painted ornament is executed in a dark brown-to-black pigment. The repertoire of designs is extremely varied and includes geometrical and animal and plant motifs. In sharp contrast to this thick coarse ware, we come across a *de luxe* fabric which is a variety of the Malwa ware. This has been found in considerable quantities at Kayatha and could therefore be classified as a distinct fabric. It should be mentioned that at Eran this finer fabric of the Malwa ware is abundant and it therefore deserves the sobriquet 'Eran Ware'. It is represented by the shapes similar to those in the Malwa ware and so also is the case of the painted motifs. It appears to be a characteristic industry of eastern Malwa. However, nothing can be said about its distribution in eastern Malwa where intensive exploration has yet to be carried out. But it should be stated that this fabric is also present at Navda Toli, though in small quantities.

The excavations at Eran conducted by the University of Saugor have yielded, according to the excavator, a new ceramic industry of the chalcolithic period.[5] It has been labelled as the painted grey ware which, however, should not be confused with the iron age pottery of the same name which occurs in north India. The painted grey ware of Eran is said to have been exactly similar to the Malwa ware so far as the fabric, the shapes and the painted patterns are concerned. The writer had an opportunity of examining the pottery of the Eran excavations through the kind permission of Professor K. D. Bajpai. It was noticed that the so-called painted grey ware was not a distinct ceramic industry as has been made out by the excavator, but that it is only the Malwa ware. On closer study it becomes apparent that some of the vessels of the Malwa ware turned greyish in parts because of the variation in firing conditions in the kiln. Similar sherds, grey in colour, have also been found at Kayatha and Navda Toli. It may not be out of place to mention here that even in Jorwe ware we find several sherds, nay complete vessels, which are brownish grey in colour. It would therefore be proper to classify the grey ware from Eran as the Malwa ware.

A very important feature of the Malwa culture which was so far unknown has

been revealed by the excavations at Kayatha. A large number of terracotta figurines of a singularly unique variety were found in the course of excavations. They comprise only animal figures among which the most predominant are the bulls. They are divisible into two distinct categories on stylistic grounds, that is, naturalistic and stylized. Both are made of extremely fine clay, free from impurities of any sort, and all are uniformly well-baked. No figurine is treated with slip of any kind, nor is there any attempt at ornamentation. The only decoration, if one can call it that, consists of nail marks over the body of animals. This, though somewhat rare, recalls to the mind similar treatment on some of the Harappan terracottas.[6] On several specimens we clearly see the finger impressions of the hands that fashioned them. The delicate modelling is evident in the long pointed horns; the hump is most prominent and the mouth pinched, while the block-legs remind us of similar treatment of protohistoric figurines from other parts of the country.

Of the naturalistic rendering there is nothing that is especially noteworthy; it is the stylized forms of bulls which deserve special attention. There are several varieties of the stylized forms. In a majority of cases the head with horns and the conspicuous hump are present but the whole hind part is absent and, in its place, we see a stem, with a rounded end; sometimes the end is flat and this serves as a pedestalled base for keeping the figurine on a platform during the ritual. The degree of stylization reaches a new mark in the form that depicts a pair of short horns on a stem or pedestal. Such horns at once remind us of the bull cult of the Minoans in whose palace at Knossos in Crete we come across several representations of a pair of horns. But it is only a family resemblance and beyond that no relationship can be hazarded.

The naturalistic and stylized forms of bulls are found together and, even among the latter, all the different varieties occur right from the beginning, thus precluding any attempt at tracing the evolution of different forms. The stylized bull forms are unique inasmuch as they have no parallels elsewhere in the country even later in the historical period and they therefore remain an enigma. They have been found in considerably large numbers and therefore seem to have been used as votive offerings; they also might have been suspended in the neck by means of thread as the Lingayats do at present. The bull cult has a hoary antiquity in India where the beast is worshipped even today.

It is rather enigmatic that the terracotta bull figurines, more particularly the stylized forms, should be absent at other sites of the Malwa culture. However, it appears that they have been found at some sites, but have not been identified as such, as they were too fragmentary. Thus a good number of terracotta animal and human

figurines have been reported from Eran. Of the published ones, two appear to be the fragments of stylized bulls.[7] Of these, one is a short stemmed with flat end and having a long curved horn; the other horn is broken. The other representation consists of a pair of short horns on a stem with rounded end. Stratigraphically they belong to the earliest pariod of occupation of the site, but have been grouped with human figures.[8] The comparative rarity of the stylized bull figurines at other sites in central India is betoken of the popularity of the cult in western Malwa, more particularly in the Chambal valley.

Thus far the Malwa culture people were supposed to be the pioneering colonizers of central India. However, the recent excavations at Kayatha have yielded extremely important evidence showing that the Banas culture flourished in western Malwa even earlier. Explorations in southern Rajasthan have established the focus of the Banas culture in the Banas valley and it appears that it also spread in the adjoining regions of Madhya Pradesh All the diagnostic traits of this culture, such as the white-painted black-and-red pottery, are present in western Malwa. But the evidence from Kayatha shows that, at least in central India, it was not purely a copper age culture but was a chalcolithic culture characterised by a specialized blade-flake industry of chalcedony and other silicious material while at the same time copper or bronze appears to have been extremely scarce. It is obviously due to the absence of suitable copper ores in Malwa, and the people therefore had of necessity started the production of lithic tools on a massive scale in order to adapt themselves to a new environment.

Another characteristic feature of the Banas culture which has been revealed by the Kayatha excavations is the stylized bull figurines. The figurines which have already been referred to in connection with the Malwa culture are actually a distinguishing feature of the Banas culture in central India. In fact it is the Malwa culture folk who borrowed the idea of the stylized bull figurines from the Banas culture people together with their white-painted black-and-red ware. As already observed, the figurines of bulls are both naturalistic and stylized. It is again enigmatic that the stylized forms of bulls should have been absent in the original home of the Banas culture, but should occur in the peripheral zone. However, a close examination of the evidence from such excavated sites of the Banas culture as Gilund and Ahar in Rajasthan shows that such bull forms are not totally absent. They could not be identified as they were too fragmentary and also insignficant in number. Thus at Gilund a fragmentary terracotta object which has been takan to be a gamesman actully appears to be a bull form.[9] So also is the case of two figurines from Ahar.[10] This would show that the stylized bull forms from Kayatha are not totally absent in the Banas valley.

The stylized bull forms have no parallels in India and even beyond the frontiers

of the country. But surprisingly enough a strikingly similar form is reported from Anau in south Russia.[11] The excavation report, however, does not contain any information regarding such bull forms except that it is a figurine of a horned animal. But the Anau specimen is far removed from the Indian in point of time and it is therefore not possible to hazard any relationship between the two. However, it may be noted that Sankalia has shown Western Asiatic contacts with the Banas culture as is evidenced by the similarity between the terracotta spindle whorls bearing incised decorative patterns.[12] The bull forms may therefore be taken as yet one more link between the Indian and Western Asian cultures.

The discovery of the Banas culture in Malwa has no doubt stretched back the antiquity of the settled life in central India to the first quarter of the second millennium B. C. But the discovery of a new culture shows that the first farmers of central India settled here even before the beginning of the second millennium. The culture has been named after the type site Kayatha (District Ujjain, Madhya Pradesh) where it was first discovered by V. S. Wakankar. He also excavated some trial trenches at the site on behalf of the Vikram University, Ujjain. The evidence from his excavations appeared to be significant and hence excavations were planned by Dr. H. D. Sankalia and conducted by the writer and Dr. Z. D. Ansari under the asuspices of the Deccan College Post Graduate Research Institute, Poona, in joint collaboration with Sri Wakankar of the Vikram University.

The Kayatha culture has been found to be entirely different from any other chalcolithic culture of the sub-continent. It is characterised by three distinct ceramic industries. The principal ware is a dark brown slipped pottery painted with designs in violet. The other is a red painted buff ware which is of extremely fine fabric The commonest shape in this ware is the typical Indian *lota* with a concave neck and a globular base. The third ceramic is what can be labelled as the 'Combed Ware' on account of its being decorated with incised design which appear to have been executed with a comb-like instrument. The decoration is, however, confined to the exterior of vessels only. The predominant shape is an open bowl. The pottery at once recalls to the mind the incised ware from pre-Harappan levels at Kalibangan. But the latter bears the incised decoration on its interior.

The foregoing analysis of the evidence from recent excavations in Malwa amply shows that the beginning of the settled life in central India can now be stretched back well before the opening the second millennium B. C. These pioneering colonisers can be taken to be the junior contemporaries of the Harappans. They disappear from the scene

around 1800 B. C. We have presently no evidence to know either their whereabouts or their antecedents. They are suceeded by the Banasians who are characterised at least in central India by their bull cult. The Malwa culture people borrowed the bull cult of the Banasians. The finer fabric of the Malwa ware which has been named herein as the 'Eran Ware' bears some resemblance with the red painted buff ware which is a charactristic ceramic industry of the Kayatha culture and it is therefore not unlikely that the latter contributed towards the making of the Malwa culture. This, however, is a tentative hypothesis which remains to be confirmed by concrete evidence. Such evidence can be furnished by a site possibly in the Chambal valley where there is a clear-cut overlap between the Kayatha and the Malwa cultures. It may help us to some extent in tracing the origin of the Malwa culture.

The bull cult of the Banasians in Malwa is another enigmatic problem. But on deeper thought it will be revealed that a people of the same culture and stock can have different religious beliefs. The parallel that immediately arises to the mind in this case is the mother goddess cult which was so predominant in the Indus cities of Harappa and Mohenjo-daro but was conspicuously absent at Kalibangan and Lothal.

Equally enigmatic is the end of the Malwa culture. At several Malwa culture sites, such as Kayatha, there is a clear break in the occupation of the site. These sites were deserted by the Malwa culture people about 1300 B. C. They remained unoccupied for about six to seven centuries and were again inhabited in sixth century B. C. For the solution of this problem the key site appears to be Nagda where there is supoosed to be an overlap between the chalcolithic and the early historic times. This may become clear when the fuller report of the Nagda excavations is published. Be that as it may, the mosaic of the cultural pattern of central India during the second millennium B. C. is gradually emerging clear as a result of the recent work.

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Mammalian Fossil Fauna : a most modern tool for dating the Pleistocene deposits

E. KHAN

Archaeologists, as far as I understand, study man, his cultures and the tools which he prepared in various environments he lived during the prehistoric times. Within the span of this time he invented numerous techniques in the preparation of tools which matched properly with the environments. Thus for thorough understanding of the background for invention of various techniques, close study of the environment is a must, and for this the biota (fauna and flora), climate, soil/rock and morphology of the region are investigated comprehensively as the environment is the sum total of the effects of these forces among themselves. It has also to be investigated whether the numerous techniques evolved gradually in different parts of the world or they developed simultaneously in the same region or in far off areas; and for solving this the palaeontological and radiometric methods are very helpful. Thus, the field of archaeology appears wide enough to be studied by a group of scholars specialised in different branches mentioned above. The aim of the present paper is to throw light on how the knowledge of the mammalian palaeontology helps to determine the geological age of the Pleistocene deposits where tools may also occur at their factory sites or after being transported from there.

HISTORICAL RUSUME

Leaving aside all that has been done on the Pleistocene, it will be appropriate to start from the work of De Terra and Paterson who tried to give a comprehensive account of India during the Pleistocene period by the study of glaciation, terrace formations, fluvo-lacustrine deposits, fauna, including early man, and the tools he used.[1] According to these authors the beginning of the Pleistocene period which is synchronous with the commencement of the first glaciation, is recognised in India at the base of the Tatrot beds, and other Indian Pleistocene deposits have been correlated after accepting it. This view is still held by many Indian archaeologists and palaeobotanists. But mammalian palaeontologists revised this view in the 18th International Geological Congress held in the Great Britain,[2] and agreed that Blancan

(USA), Villafranchian (Europe), Pinjaurs (India), and Djetis beds (Java) marked the beginning of the Pleistocene equivalently. Later, by a detailed study of the fauna and the lithology of the Upper Siwaliks, east of Chandigarh, it has been recognised that the Lower Boulder Conglomerate is equivalent to Gunz[3] and other Indian Pleistocene deposits have been correlated on this basis. Recently a new correlation chart of the Indian Pleistocene deposits has been given.[4] (Fig. 1)

METHODS OF CORRELATION AND AGE DETERMINATION

The degree of fossilisation was sometimes considered as a valid criterion for distinguishing the old from the young age bed. But it has now been widely recognised that the fossils collected from the younger sandstone beds were more fossilised than those from the older clay beds. Even the degree of fossilisation in sandstone beds of the same age from different localities is not the same if the conditions for fossilisation at two places differ.

It has also been observed that with the passage of time flourine and nitrates, etc., gradually accumulate in the fossils. Thus it was presumed that the high percentage of these in the fossils collected from a bed would be older than the bed or beds whose fossils show low percentage of these. Later experience proved that the high or low percentage of these items does not indicate the geological age of the bed. On the contrary, it presents the high or low percentage of these items in the beds where the fossils come from.

Similar heavy mineral suits were used for correlating the beds. But it was discovered after considerable work that similar heavy mineral suits might be of different ages, whereas dissimilar heavy mineral suits might be of the same geological age. Thus, similar heavy mineral suits indicates similar source rocks rather than similar geological age.

Human artefacts have sometimes been used for determining the geological ages of the beds where they have been collected from. But it has been realised that they are not always *in situ* and mostly have come to rest there by way of transported material from factory sites.

K/Ar and C^{14} methods are very useful to find out the exact age of the rocks, directly and indirectly despite some discrepancies. But C^{14} method is not applicable for the rocks older than 60,000 years, and K/Ar method is unreliable for the rocks younger than 1,50,000 years[5], whereas the period from 1,50,000 to 60,000 years is very crucial for prehistorians. Under these circumstances only fossils can be helpful for

correlation of the rocks and other geological formations of this period.

PALAEONTOLOGICAL METHOD

The purpose of the palaeontological studies is to date the rocks in which the fossils are found, and consequently to correlate the rocks occuring far apart from one another. Invertebrate fossils are used for correlating the Palaeozoic formations, when evolution and dispersal of these animals were rapid, and vertebrate fossils were inadequently known. Mainly reptilian fossils are relied upon for the correlation of the Mesozoic formations, and invertebrate fossils serve as supplements. Tertiary and Quaternary formations are correlated mainly on the mammalian fossils, when their evolution and migration were very fast, whereas those of invertebrate (except for micro-fossil) and reptilian were almost constant.

Despite the fact that during the 19th century vertebrate fossils were the only reliable source to date the Mesozoic, Tertiary and Quarternary formations, geologists rarely used them for correlation, and mostly depended upon the invertebrate fossils. This was only because of the rarity of the vertebrate fossils. Besides, their detailed morphological study demanded more time which geologists of that period could not afford. Naturally, the study of the vertebrate fossils was taken up by zoologists who did not care for the localities and horizons which yielded the fossils. Ultimately, vertebrate fossils became show-pieces of museums practically without any correlative use. During the period, the knowledge of the vertebrate palaeontology was developing and refining; geologists, finding the invertebrate fossils inadequate, resorted to other methods for correlations mentioned above. But as has already been said, invertebrate and reptilian fossils are not useful for correlative purpose of the Pleistocene period. Palaeobotany of this period was also not much developed and refined for the determination of the age, except for ecological interpretation. Thus, in this connection, only mammalian fossils can be safely used since nearly all large forms of the Pleistocene period are thoroughly studied with respect to their temporal and spatial distribution.

A brief summary of how it has been achieved is given below with reference to Indian works only to maintain brevity.

In the first half of the nineteenth century vertebrate fossils were collected in India with great enthusiasm and their brief descriptions mostly appeared in the journals of the Asiatic Society of Bengal, but specific localities were not mentioned, and passing reference to the geological age was made. The last phase of this type of work is that of Falconer.[6] Lydekker[7] took up detailed description of the specimens

Fig. 1. SUMMARY OF CHRONOLOGICAL PLEISTOCENE EVENTS IN INDIA

AGE	DE TERRA & PATERSON (1939)		SANKALIA (1962)	
	JAMMU & PUNJAB	CENTRAL INDIA		CENTRAL INDIA
Holocene	T 5	T 5=Cotton Soil		Dry, New alluvium chalcolithic Dry, silt (upper clay) Microlith & survival of Middle Palaeolithic tool type
IV glaciation	T 4, loam silt and gravel. Reddish loam	T 4=Pink clay (upper silt)	Late Pleistocene	Wet, gravel (Upper gravel) Middle Palaeolithic or late soan and rolled Lower Palaeolithic Abbevillio-Acheulian
III inter-glacial stage	T 3, Degradation (Soan industry)	T 3=sand (upper gravel)	Middle Pleistocene	Dry, silt (lower clay), developed Lower Palaeolithic. Fresh Acheulian Hand axes and Flakes
II glaciation	T 2, Potwar loessic silt, ±350 ft. (Soan industry)	T 2=Pink clay (lower silt)	Middle Pleistocene	Wet, gravel (lower gravel) Lower Palaeolithic Abbevillio-Acheulian
II inter-glacial stage	T 1, Upper Terrace gravel (Chello-Acheulian and Early Soan Cultures)	T 1=Conglomerate and sand (lower gravel)	Middle Pleistocene	Dry............................
II glaciation	Erosion, tilting, Boulder Conglomerate zone ±2000 ft. Boulder gravel in fan formation (oldest Flake industry)			
I inter-glacial stage	Pinjore zone ±2500 ft. Pink silt and sand, Early Pleistocene fauna of Upper Siwaliks		Early Pleistocene	
I glaciation	Tatrot zone, conglomerate and sand, Upper Siwalik fauna		Early Pleistocene	Wet, Primary laterite
Early Pleistocene				
Upper Pliocene				

SAHNI & KHAN (1964)		KHAN (1968)	
PUNJAB (Simla Hills)	NARMADA VALLEY	PUNJA (Simla Hills)	NARMADA VALLEY
T 5	? Break	T 5	Black Cotton Soil
T 4	Upper silt	T 4	Narmada Channel = Hiatus
T 3	Upper gravel	T 3	upper silt upper gravel lower silt lower gravel (Lower & Middle Stone Age tools)
T 2	lower silt	T 2	lower gravel ?
T 1	lower gravel	T 1	?
Upper Boulder Conglomerate		Upper Boulder Conglomerate	?
Break		Hiatus ?	
Lower Boulder Conglomerate		Lower Boulder Conglomerate	
Pinjaur		Pinjaur	
Tatrot		Tatrot	

briefly described by earlier workers. He paid special attention to mentioning the localities but was not very careful about horizons. Pilgirm[8] was very particular of the horizons which yielded fossils. For this purpose he himself made fresh collections from the Potwar region and rejected all earlier collections which, in his opinion, were admixture of various horizons.[9] Thus, he. for the first time, established well founded correlation of the Siwaliks based on assemblage of fauna. Matthew[10] challenged the correlation put forward by Pilgrim, and emphasised that appearance of new species is a better criterion for correlation than that based on the assemblage of fauna, which indicates more of ecological environments rather geological age of the beds. Pilgrim modified his previous view to a great extent.[11]

Recently, the Upper Siwaliks around Chandigarh has been thoroughly investigated,[12] and for the first time a definite line of demarcation has been drawn between the Tatrots (Upper Pliocene) and Pinjaurs (Lower Pleistocene) on the basis of the appearance of new species. Very recently the author[13] visited the Narmada alluvial deposit, and also checked the fossils collected earlier from there. He has come to the conclusion that the age of the deposit ranged between 1,20,000 to 60,000 years, and the implements are unreliable to determine the geological age of the deposit since they are not at the factory sites but have been transported there from such sites. *In his opinion the Early Man reached Central India during the third glacial age.*[14]

The above conclusion has been drawn on the basis of mammalian fossils whose knowledge has been refined to such an extent that K/Ar data are checked with the age of the beds determined through mammalian fossils[15]

To elaborate the above point further it is better to explain it by the examples of some fauna fossils.

Stegodon :—The earliest species (*S. clifti*) of this genus is known from the Dhok Pathan stage (Middle Pliocene). This species is replaced by another advanced species (*S. insignis-ganesa*) during the upper Pliocene (Tatrots) and a further advanced species (*S. pinjorensis*) becomes common during the lower Pleistocene (Pinjaurs). Naturally, a more advanced species is expected from the Narmada alluvial deposit. But the species of *Stegodon* common in the Narmada fossil collection is recognised as *S. insignis-ganesa* whereas this is highly misleading. This is so only because the Narmada fossil collections have not been revised by any competent palaeontologist, and the result is that the mistake made in the early days has been repeated. It has been the practice during early days that new species were established on isolated teeth, whereas it has been proved beyond doubt that the characters of the skull should be

taken on the whole, and no over-emphasis be laid on the characters of the isolated teeth, which are subjected to variation depending upon the age, sex and individual variations.[16]. Clearly, till complete skull of *Stegodon* is unearthed from the Narmada alluvial deposit the fossils should not be identified beyond generic stage. Recently, it has been claimed that *Stegodon* did not exist during the period the Narmada alluvial deposit was laid down[17] but a molar of the genus has been collected by the same author from there (Geology Museum, Panjab University). Moreover, most of the photographs of the fossils have not been properly arranged by Khatri to show the characteristic features of the species or even of the genus.[18] I am of the opinion that we in India urgently need publications with detailed and correct study and more photographs than hitherto available.

Hypselephas hysudricus.—The earliest fossil of this species is known from the Pinjaurs (Lr. Pleistocene), and it seems that this genus originated from *Archidiskodon planifrons* which itself orginated during the lower part of the Upper Pliocene. A variant of *Elephas namadicus* has similar teeth characters as those of *H. hysudricus*, and the finds of isolated teeth compelled the earlier workers to recognise them as those of *H. hysudricus.* This mistake has been repeated since those days, and recently even the skull of *E. namadicus* has been incorrectly identified as *E. indicus.*[19] The author studied almost all the material in the British Museum, Museum of the Geological Survey of India, Geology Museum of Panjab University, and came to the conclusion that the teeth recognised as those of *H. hysudricus* actually belong to *E. namadicus*, after taking into account the morphological characters of the skulls on the whole to which teeth of such characters are attached, and the distribution of *H. hysudricus* and *E. namadicus* in space and time.

Bovidae.—The sub-family of Bovidae can be identified with some degree of certainty, even on the basis of isolated teeth. But it is nearly impossible to distinguish the genera of the same sub-family on the basis of such teeth. Till complete skulls are found, species of the same genus cannot be separated but it has been the general practice that all the specimens of bovids, found in the entire Narmada alluvial deposit are recognised as *Bos namadicus*, and even in a recent work[20] this has been followed. Thus it seems that the same species (*Bos namadicus*) persisted from the Middle to Upper Pleistocene without any specific change, whereas this, in general, is against the observations made world over about the mammalian fossil fauna of the Pleistocene period.[21] Unless all the specimens of *B. namadicus* in British Museum, Museum of Geological Survey of India and Geology Museum of Punjab University are restudied thoroughly, definite identification of incomplete skulls cannot be made.

The claim of Khatri[22] that the remains of *Bison* are found in the Narmada beds, is

FIG. 2. **SPECIES AND THEIR GEOLOGICAL RANGES**

Species	Upper pliocene	Pleistocene			
	Tatrot	Pinjaur	1st to 3rd glacial	3rd Inter-glacial	4th glacial
PRIMATES.—					
Papio sub-himalayanus	—	—			
Presbytis sivalensis			?		
Presbytis entellus					—
CARNIVORA.—					
Mellivora sivalensis		—			
Ursus namadicus				—	
Crocuta sivalensis	—	—			
Hyaena crocuta					—
PROBOSCIDEA.—					
Stegodon insignis-ganesa	—	—			
Stegodon pinjorensis		—			
Stegodon (? namadicus)				—	
Mammuthus (Archidiskodon) planifrons	—	—			
Elephas (Hypselephas) hysudricus		—			
Elephas (Platelephas) platycephalus	—	—			
Elephas namadicus				—	
RHINOCEROTIDAE.—					
Rhinoceros sivalensis		—			
Rhinoceros karnuliensis					—
Punjabitherium platyrhinum		—			
Rhinoceros deccanensis				—	
EQIDAE.—					
Equus sivalensis		—			
Equus namadicus					
Equus asinus					—

Species	Upper Plocene	Pleistocene			
	Tatrot	Pinjaur	1st to 3rd glacial	3rd inter-glacial	4th glacial
HIPPOPOTAMIDAE.—					
Hexaprotodon sivalensis	—	—			
Hexaprotodon palaeindicus				—	
SUIDAE.—					
Sus hysudricus	—	—			
Sus (? namadicus)				—	
CAMELIDAE —					
Camelus sivalensis	—	—			
GIRAFIDAE.—					
Sivatherium giganteum	—	—			
BOVIDAE.—					
Sivacobus palaeindicus		—			
Hemibos triquetricornis		—			
Hemibos acuticornis		—			
Leptobos falconeri		—			
Pre-bison debmi	—	—			
Bison sivalensis		—			
Bos namadicus				—	—
Bubalus platyceros		—			
Bubalus palaeindicus				—	—

baseless because it is based upon not only incorrect identification of the fossils but also author's inadequate knowledge of the distribution of *Bison* in space and time.

Now it should be clear that wrong identification of the specimen is wholly responsible for misleading determination of the geological ages of the deposits, whereas the correct identification gives extremely precise results.

GEOLOGICAL RANGE OF IMPORTANT INDIAN PLEISTOCENE MAMMALIAN FAUNA

It would be appropriate to mention here that the Siwalik Hills and Narmada Valley are famous for the mammalian remains of the Pleistocene period. Till very recently it was the general view that the remains of the mammalian fauna are found in India from the Lower to the Upper Pleistocene without any faunal break—the mammalian fauna of the Lower Pleistocene in the Siwaliks and those of the Middle and Upper in the Narmada alluvial deposits. But the author is of the view[23] that almost all the mammalian remains unearthed from the Narmada alluvial deposits are of the last interglacial age. *Thus, on the one hand, the mammalian fauna existing in India during the time from the first to third glaciation is unknown so far, and on the other hand, the fauna of the last glacial age is scantily recognised.* Till this knowledge is complete, actual geological ranges of the known Pleistocene mammalian fauna of India cannot be definitely found out. However, taking into account the origin, migration, evolution, distribution and geological ranges of the various mammalian fauna of the world, the geological ranges of the Indian Pleistocene mammalian fauna can be inferred with greater degree of precision by the experienced palaeontologists. For general guidance geological ranges of the various Indian mammalian fauna of the Pleistocene period is given below. (Fig. 2)

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An Appraisal of the protohistoric problems of the Ganga-Yamuna doab

R. C. GAUR

Sufficient material belonging to the protohistoric period has been brought to light in the Doab during last two decades. A proper assessment of the entire material is, therefore, necessary; particularly to determine the possible correlation between the various cultural deposits. Following cultural complexes have so far been unearthed in this region:

1. The Harappan or late Harappan
2. The Copper Hoard
3. The Ochre Coloured Pottery
4. The black-and-red ware
5. The Painted Grey Ware

Since the Harappan, the Copper Hoard and the O.C.P. complexes are more or less contemporaneous, it would be better if these three are examined simultaneously. Among the excavated sites of the Doab, Alamgirpur, on river Hindon in District Meerut, is alleged to be a Harappan site, representing a late or degenerate phase of the great civilivation.[1] Although several distinctive features are present to provide it its present nomenclature yet, it may be noted, the distinguishing characteristics of the Harappan civilization, such as big buildings, seals, evidence of writing, human figurines, etc., are conspicuous by their absence. On the other hand, if examined minutely, many new elements, foreign to the great civilization, may be seen in the excavated assemblage. Several pottery types, including vases with flaring[2] and out-turned[3] rims, vases with globular profile[4], basins with flaring and horizontal rim[5], knobbed lids[6], etc., are almost similar to those found in the O.C.P. industry. Paintings in black pigment, in the form of thick rim bands and parallel lines of varying thickness, are also common in both the industries. The incised device to decorate[7] the pottery, which was prevalent at Alamgirpur, is a typical phenomenon of the O.C.P. assemblage and not of the Harappan. An indeterminate crescent like object[8] having holes also looks similar to a terracotta object found at Lal Qila[9] in District Bulandshahar. All these features are worth considering, more so, when we know that the Harappans generally refused to learn innovat-

ions. Why then Alamgirpur presents such an assemblage ? In order to answer this question, representative cultural deposits both of the Sutlej and Ganga regions are to be examined carefully and minutely.

Of all the sites, Bara[10], in the Punjab, hardly 8 kms. from Rupar, is a typical site. Here two main phases—one representing a late phase of the Harappan culture and the other yielding certain new ceramic traditions including incised designs—were unearthed. Dr. Sharma[11] is, however, of the opinion, that seemingly Bara has, 'some affinity with the pre-Harappan Kalibangan and, although influenced by that tradition it still appears to be later than Ruper' (See elsewhere in this volume in the proceedings of the Seminar on O.C.P. *ed.*). His views more or less is corroborated by Deshpande.[12] According to him Bara 'may represent a reconciliation between the conquered pre-Harappan and the pre-Harappan Kalibangan. The people, when became conquered, moved in isolation and one finds their pottery with incised design'. While these presumptions have been made on the basis of the incised designs on the pottery, Cemetery 'H' influence on Alamgirpur has also been postulated[13], particularly on the basis of a few pottery types. Lastly, there comes its asscciation with the O.C.P.[14] The writer of the paper recently got an opportunity to examine the Bara pottery afresh.[15] Resemblances seem to be present between Bara and Lal Qila complexes in the following types and decorative designs:

A. Pottery Types:

(i) Jars having splayed out rim, narrow neck, bulbous body and rounded base.

(ii) Dish-on-stand with short stem (?).

(iii) Basins with flat projection and undercut rim.

(iv) Vessels with rusticated surface.

B. Paintings:

(i) Fully painted neck of the pots havings horizontal single or multiple bands.

(ii) Hatched triangles.

C. Incised designs:

(i) Checked or compartmented designs.

(ii) Leaf pattern.

(iii) Wavy lines.

In the light of the above details, Bara seems to be a conglomeration of Kali-

bangan I, Harappan, Cemetery 'H' and the O. C P. elements. It appears that Sutlej played an important role in the days of the late Harappan life. How and when the Harappans were forced to move to the Sutlej region and beyond in the northern and north-eastern zones of the western Punjab, is not known. This would perhaps have happened sometime around 1750 B.C. Not only the Harappan traditions travelled, but it seems that pre-Harappan traits also reached there. Though both the traditions appear to have survived in that region. their exact relationship in respect of time and influence cannot be determined at present.

However, the traces of Bara tradition have been noticed at several sites recently explored in the Sutlej basin.[16] Further eastward movement of the people to the Doab region is another noteworthy event of our protohistory. Bargaon[17] is an important station in this respect. Here we find the Harappan traits surving along with such pottery which have incised designs on both the sides, resembling those found in Kalibangan I.[18] However, Bargaon provides an interesting complex. I had an opportunity of handling the Bargaon material at Dehradun.[19] It has been observed during the study that the lower level was dominated by the Harappan pottery types: the middle level shows an overlap between the Harappan and the O.C P. shapes; the upper level is mainly represented by the O.C.P. industry. However, the difference between the first two levels is not very distinct.

More than a hundred red ware sites belonging to the protohistoric period have been explored in the districts of Upper Doab, in U P., some of which have already been excavated. In is an interesting observation that none of these sites is devoid of the O.C.P. element. In fact, except Alamagirpur and the lower settlement of Bargaon, all the sites basically belong to the O.C.P. group. It has been observed that while the sites near the Punjab border in U.P. also include pottery shapes of the Harappan derivative or influence, those lying away eastward in the districts of Bulandshahar, Etah, Etawah and their neighbourhood, yield no such shapes and their assemblages bear distinct regional characteristics.

In the light of the above analysis the red ware industry of the Upper Doab[20] belonging to the protohistoric period may be classified into the following groups:

(i) *Genuine O.C.P. Sites:* Such as Atranjikhera, Lal Qila, Ahichchhatra[21], Hastinapur[22], Saipai[23].

(ii) *O.C.P. sites with Harappan influence*: Such as Bahadarabad[24], Ambkheri[25], Upper phase of Bargaon.

(iii) *Harappan sites with O.C.P. influence:* Such as Alamgirpur, lower phase of Bargaon.

It is now almost evident that the Harappan and the O.C.P. people belonged to two different cultural groups and were independent of each other. It also appears that the Harappan penetration in the Upper Doab was of temporary nature and devoid of its prosperity. The respective presence of the O.C.P. shapes at Alamgirpur and the Harappan shapes at Bahadarabad and Ambkheri also suggests that the peoples of the two cultures came in close contact with each other, at least for sometime, and borrowed, to some extent, the traditions of each other. These observations obviously pose the following questions:

1. What is the time bracket of the O.C.P. culture ?
2. What is the association of the O.C.P. and the Copper Hoards ?
3. Who were the authors of the O.C.P. industry ?
4. How and when the O.C.P. culture came to an end ?

Regarding the time bracket it is generally believed that the culture flourished sometime in the first half of the second millennium B.C.[26] This date has more or less been corroborated by the thermoluminiscent dating of a few pottery-sherds from Atranjikhera, Lal Qil, Jhinjhina and Nasirpur, determined by the Archaeological Research Laboratory at Oxford.[27] Of all these sites, Lal-Qila is the only undisturbed site. On the basis of the two dates available for the site, the O.C.P. culture may be placed here in the time bracket of 2030-1730 B.C. with a mean of 1880 B.C. However, other dates indicate that the culture-survived for a longer period at other sites. With this dating, the O.C.P. culture becomes almost contemporaneous with the Harappan Civilization In this light, the whole problem has to be studied afresh.

So far as the relationship of the copper-hoards with the O.C.P. is concerned Lal[28] had already associated them with them O.C.P. people on the circumstantial evidences, as far back as 1951. Since then the hypothesis has gained further ground. Definite association of the copper with the O.C.P. has recently been established through a few excavations. A copper ring, familiar from Pondi and Bahadarabad, was reported from the reguler excavations at Bargaon[29]. A piece of copper and broken pieces of terracotta crucibles containing copper grains were found by me at Atranjikhera in 1965-66. However, of particular significance has been the discovery of the copper objects including an arowhead (?), a pendent, a bead and a broken piece of celt at Lal Qila. The association of the copper-hoards with the O.C.P. has further been strengthened by the discovery of a copper-hoard from an O.C.P site adjacent to a village Kiratpur, on the

Kali Nadi, at a distance of about 3 kms. towards west from Lal Qila. This hoard includes an anthropomorphic figure, two celts, one of which has a five pointed star engraved on it, and rings or bangles. It is further reported that a sword and a harpoon, typical of copper hoards, have been dug out from an O.C.P. deposit at Saipai in district Etawah. This place had already yielded a big copper hoard in the past.

Since the association of the copper-hoards of the Doab with the O.C.P. has now been established the next problem is to determine the identification of the authors of the 'Copper-Hoard—O.C.P. culture'. Three hypotheses have been advanced:

1. They were the late or refugee Harappans.[30]
2. They were the indigenous people of the Ganga-Yamuna Doab[31].
3. They belonged to the Aryan stock[32].

As far as the first possibility is concerned, perhaps that has no validity now. It has already been discussed above that the Harappans and the O.C.P. people were independent of each other and were of two different stocks. The next comes their equation with the indigenous people. Who could they be ? The Austroloid ? No doubt, the cultural influences of the Austroloid group—ancient *Nishadas (?)* is still prevelent to some extent in our society. They spoke, probably, the *Munda* language. Many villages in Mirzapur District, from where protohistoric cave-paintings have been reported, derive their names from that language.[33] The Aryan penetration in the Ganga Valley, perhaps forced them to flee towards the south and south-eastern regions around the Vindhyan mountains. Later on though they were absorbed within the Aryan Society, they always constituted a different group within that fold as well. *Brihad-Devata*[34] calls them as the fifth *Varna*. But since the main spread of the O.C.P. culture was in the Upper Doab with extension towards the west, its identification with the Austroloid does not seem, at the present state of our knowledge, tenable. Then to which stock they belonged? The answer does not seem easy and perhaps cannot be answered at present. However, all available anthropological, linguistic and archaeological data must be taken into account before we accept or reject their identification with any aborginal group finally.

Lastly, comes their association with the Aryan stock. Each of the distinctive protohistoric remains, viz., the Harappan[35], the Black-and-red Ware, both painted and plain[36], and the P.G.W.[37] has at one time or the other been seperately associated with the Aryans. No attempt, however, was ever made to equate the O.C.P. people with any wave of the Aryans. But since the authors of the Copper-Hoard and the O.C.P. now appear as one and the same, a claim that was made for them much earliar by R.

Heine Geldern[38], of course, on different grounds, may again be considered. He had seen distinct western impact on the various Copper-Hoard tools. However, the observation, as pointed out by Lal,[39] perhaps, did not apply to the tools of the copper hoards found in the Ganga basin. But the possibility of their being the Aryans may not be shelved unless all the factores are analysed once again. Suffice to say at present that the co-existence of the Harappan and the Copper Hoard people with distinct entities and traits in the same region between the Sutlej and Ganga rivers and the presence of an anthropomorphic (?) figure in phase IV of Lothal belonging to circa 19th Century B.C. or a little later[40] do provoke searching analysis of the problem.

As far as the study of the black-and-red ware assemblage (Group no 4) is conerned in this part of the country it is still in its infancy—nay in its embroynic stage. Its exact relationship has not yet correctly been determined with those found in the Banas valley[41] on the one hand those found in the eastern Punjab,[42], Haryana[43], eastern and nothern Rajasthan[44], on the other. It is significant to note that the black-and-red ware deposit as a separate cultural phase has so far been demarcated only at two sites, viz. Atranjikhera and Noh. The insignificant presence of the black-and-red ware industry at all the P.G.W. sites indicates that the industry was not a major component of the deposit. At Atranjikhera the pottery analysis[45] has shown that the black-and-red and Black-Slipped ware industries were in much better position in the earliest phase of the P.G.W. deposit and had out-numbered the P.G.W. industry itself. Gradually the P.G W. and the Grey ware improved their positions and they virtually ousted the other two potteries. The two then could survive only in name. This is indicative of the fact that the black-and-red and Black-Slipped wares were predecessors of the P.G.W. industry. But this is not the case with the sites excavated in the central Ganga valley, more precisely in the eastern part of Uttar Pradesh, such as at Prahladpur[46], Rajghat[47] Mason[48], Gularihwaghat[49]. A comparative study[50] of the cultural material from the black-and-red ware phase of these sites has clearly shown a general affinity among themselves and they all appear to belong to the Iron Age. The general characteristics of the cultural assemblages from these sites is nearer to the late phase of the P.G.W. deposit datable around 7th-6th centuries B.C. This fact has also been corroborated from the C^{14} dates. However, the black-and-red ware phase of Sonpur[51], further east in Bihar, comes probably from a pre-iron deposit. Be that as it may, there appears a great necessity of tapping more sites in the regions between Atranjikhera and Sonpur to have a clearer picture of the pre-iron black-and-red ware plain or painted, deposits more so when the industry continues in the Iron Age deposits. As far as the black-and-red ware industry of the Punjab and the eastern and northern Rajasthan is concerned, its association with the P.G.W. seems apparently proved, as both the wares have been picked up together during the course of explorattons. It is very likely that if some of these sites,

as well as a few of western U.P., are excavated properly, a distinct phase of the black-and-red ware industry would come to light below the P.G.W. levels.

As far as the last group, namely, the P.G.W. industry is concerned, a detailed discussion was held at Aligarh Seminar in August 1968. The report is in the press. Since then no appreciable progress has been made in this direction and, therefore, I will prefer to exclude this group from our present discussion. However, the general consensus which emerged at Aligarh may be ennumerated here:

1. That the P.G.W. is an industry associated with those Aryans who lived during the Mahabharata period.
2. That its life span is likely to be roughly between 1100 and 500 B.C.
3. That the industry is indigenous one and has no affiliation whatsoever with any pottery outside India[52] of the ancient period.
4. That there is a great necessity of conducting horizontal excavations on a large scale of few selected P.G.W. sites in order to have an insight into the life of the Painted Grey Ware people.

However, it may be noted with great satisfaction that every now and then new sites[53] of the P.G.W. are coming to light, with the efforts of the devoted field workers, and the day is not far away when some of the major problems related with the P.G.W. will easily be tackled.

NOTES

1. *Indian Archaeology-A Review*, (Hereafter *I.A.R.*) 1958-59, pp. 50-52
2. *Ibid* , Fig. 24-28
3. *Ibid.*, Fig. 24-79
4. *Ibid.*, Fig. 24-13
5. *Ibid.*, Fig. 24-6
6. *Ibid.*, Fig. 24-14
7. *Ibid.*, Plate LXII, Period I
8. *Ibid.*
9. Lal Qila excavations were conducted by the Department of History, A.M.U; Aligarh, under the direction of the writer of the present paper.

10. *I.A R.*, 1954-55, pp. 9-10, Plate XI.
11. Sharma, Y.D., *Archaeological Remains, Monuments & Museums*, Part I (Delhi, 1964), p. 9.
12. Deshpande, M.N., comments, *Indian Prehistory: 1964*: ed. Drs. V. N. Misra & M. S. Mate (Poona, 1965), p. 127.
13. (i) Allchin, B. & R. , *The Birth of Indian uivilization* (London, 1969), p. 149. (ii Dikshit, K.N., "Nature of Harappan ware in Sutlej Valley", *Potteries in Ancient India* (Patna, 1969), p. 58.
14. Deshpande, *op.cit.*
15. The Bara pottery has been seen through the courtesy of Sri Y. D. Sharma.
16. *I.A.R.*, 1963-64, p. 17.
17. (i) *I.A.R.*, 1963-64 (ii) Deshpande, *op.cit.*
18. *I.A.R.*, 1960-61, 61-62, 62-63, etc.
19. The pottery has been seen through the courtesy of Shri M.N. Deshpande.
20. More O.C.P. sites are gradually coming to light from the lower Doab as well as from the adjoining areas of the upper Doab.
21. *I.A.R.*, 1964-65, p. 39.
22. Lal, B.B., "Excavations at Hastinapur and other Explorations..." *A.I.* no. 10-11, pp. 10-11.
23. (i) Thapar, B.K., "Methodology in Archaeology", paper read at the Indian Archaeological Society's Annual Conference, Nagpur Session, 1970. (ii) Pottery seen through the courtesy of Shri B.B. Lal.
24. Sharma, Y.D., "Copper-Hoard and the ochre colour ware in the Ganga basin", paper read at the 1961 conference on Asian Archaeology, New Delhi. (ii) *Archaeological Remains, Monuments & Museums*, p. 12.
25. (i) Deshpande, *op. cit.* (ii) *I.A.R.*, 1963-64.
26. Gaur, R.C., comments, *Indian Prehistory: 1964*, pp. 142-45.
27. Information from David Zimmerman, Oxford. Letter addressed to Prof. S. Nurul Hasan, A.M.U., Aligarh.
28. Lal, B.B., "Further Copper Hoards—A Review of the Problem", *A.I.*, no. 7.
29. cf. Krishna Deva, "Problem of the Ochre Coloured Pottery", *Potteries in Ancient India, op. cit.*, p. 77. (ii) Deshpande, *I.A.R.*, 1965-66, 66-67.
30. (i) Ghosh. A., "The Indus Civilization...", comments, *Indian Prehistory: 1964* (ii) Rao, S.R., comments, *Potteries in Ancient India*, p. 80.

31. (i) Lal, *op. cit.* (ii) Gupta, S.P., comments, *Potteries in Ancient India*, p. 66. (iii) Gaur, *op. cit.*

32. Heine Geldern, R. (i) "Archaeological Traces of Vedic Aryans", *Journal Indian Society of Oriental Art* no. 4, 1936 (ii) "The coming of the Aryans and the end of the Harappan culture". *Man*, 1956.

33. *Linguistic Survey of India* vol. IV, p. 9. See also, S.P. Gupta, "Indian Copper Hoards ..", *Jr. Bihar Research Society*, vol. XLIX, 1963, pp. 137 ff.

34. *Brihad-devata:* Vol. I. 453.

35. Ramchandran, T.N., *Presidential Address, Ind. Hist. Cong. Sec* I, Agra Session, 1956.

36. (i) Sinha, B. P., "Black-and-red ware and the Aryans", *Ind. Hist. Congress*, Alig. Sess. 1960 (ii) cf. Sharma, G.R., *The Excavations at Kausambi*, (Allahabad, 1960), pp. 10-13. (iii) cf. Sankalia, H.D., and others, *The Excavation at Maheshwar and Navadatoli* (Poona, 1958), pp. XIII and 2 to 4.

37. Lal, *A.I.*, no. 10-11. Also, *Presidential address: Seminar on the Painted Grey Ware*, Aligarh, 1968.

38. *op. cit.*

39. cf. Lal, *A.I.*, no. 7

40. Lal, *Indian Archaeology Since Independence* (Delhi, 1969), p. 19. Also, S. P. Gupta, "Further Copper Hoards, a Reassessment...", *JBRS*, vol. LI (1965), pp 1-7.

41. cf. Sankalia, Deo, Ansari, *Excavations At Ahar* (Poona, 1969).

42-43-44. *I.A.R.*, 1956-57; 57-58; 58-59; 62-63; 63-64; etc. Dikshit, "A note on the Problem of the Plain Black-and-red Ware in India", *Pott in Anct. Ind.*, pp. 48-55.

45 Gaur, Paper on P.G.W. Assemblage, Aligarh P.G.W Seminar, 1968. (In Press).

46. cf. Narain, A.K., & Roy, T.N., *The Excavation at Prahaladpur* (Varanasi, 1968).

47. *I.A.R.*, 1960-61, 61-62, 62-63, 1963-64, etc.

48. *I.A.R.*, 1964-65, etc.

49-50. Roy, T.N., "The Pre-Northern Black Polished Ware Deposit", paper read at P.G.W. Seminar, Aligarh, 1968.

51. Verma, B.S., "Black-and-red ware in Bihar", *Potteries in Ancient India* pp. 102-11.

52. Ghosh, A., "A note on the Homeland of the Painted Grey Ware", paper read at Aligarh P.G.W. Seminar 1968.

53. *I.A R.*, 1962-63, 63-64, 64-65, 67-68, etc.

NOTES & NEWS

A BONE AND ANTLER INDUSTRY FROM ALLAHAPUR, DISTRICT MEERUT

INTRODUCTION

The ancient mound of Allahapur,[1] about 13 kilometres west of Muradnagar in U.P., lies on the left bank of the river Hindon, a tributary of the Yamuna. The nearest village is Surana. The excavation of the site was taken up in order to augment our knowledge about the culture-complex of the Painted Grey Ware using people. In all, fourteen layers revealed an occupational deposit of about 2·80 metres, which was broadly divided into two periods. The excavations not only confirmed the nature of the Painted Grey Ware complex encountered at other sites in the Ganga-Yamuna Valley but also added a new factor: the preponderance of the plain black-and-red ware over the Painted Grey Ware during the early phase (IA) of the occupation of the site (layers 13 and 14). Significantly enough, the shapes of the black-and-red ware and Painted Grey Ware are the same. It seems probable that the Painted Grey Ware phase at Allahapur flourished for a longer period in comparison to other sites in the Upper Ganga-Yamuna doab since it clearly overlaps with the Mauryan levels. The excavations at Allahapur also revealed a variety of bone objects such as arrowhead,[2] stilus and awl. They require a detailed techno-typological study because these objects have not been encountered in the past in such a large number from any of the Painted Grey Ware sites.[3] It is significant to note that 90% of these objects are manufactured out of antlers. The presence of a number of unfinished objects indicates that the tools were locally made, a fact which may also show that it was a village of bone-tool makers who supplied the tools to other nearby settlements.

TECHNIQUE OF MAKING TOOLS

The technological studies of the bone implements found in the Painted Grey Ware complex at Allahapur allow us to work out different stages[4] of their manufacture. The simplest method of working antler,[5] a solid bony out-growth arising from the frontal bones of male species, generally, was to select a particular point where it was to be broken. It was first charred over fire and then the charred place was scraped with a

sharp tool. Thus the notch produced penetrated through the compact layer into the spongy matter below. Now it could be broken without any difficulty. It may, however, be pointed out that several examples are available where a notch was obtained even without firing the area in which the point of weakness was to be created.

In some parts of Maharashtra[6] (specially in the Ratnagiri District), a few centuries ago, a portion of bison horn was kept moist with coconut oil and heated on a fire until it became as soft as wax. It was then worked, or pressed into the required form, either with hands or in moulds made of hard wood. The object was finished off with scraping tools and a small lathe. The linear ornamentation seems to have been executed by a fine, double pointed graving tools of iron. The few tools found are extremely simple: a thick small wire with a flattened end. They are also likely to have used a small rude lathe, a fine saw a few triangular blades without handles (for scraping and polishing), three or four graving tools of different sizes, with a file or rasp. Even in modern times[7] antlers are boiled in hot water before they are cut by sophisticated specialised saws.

A few unfinished points from Allahapur shed a valuable light on the successive manufacturing stages (Plate III). There are evidences to show that antler, in a number of examples, was first charred over fire. After removing the desired piece (from the main horn) from the central part of the charred portion, the chopping was roughly done at one end for preparing the tool. First the tang was made, then the blade body was dressed up to the desired shape anb size. Thus, once the whole body has been roughly brought out, probably with the help of a few metallic implements, the object was subjected to burnishing and polishing. First the blade was tackled and then the tang.

MICROSCOPIC EXAMINATION

The microscopic studies[8] revealed some important clues regarding the mode of fabrication of bone tools. The bone-antlers were rendered soft by keeping them in hot water for sometime. In some cases coconut oil was used to soften the structure. As the tissue are hygroscopic in nature, they absorb the liquid in which they are immersed and become soft. In the present case, a few antler pieces were burnt as is evident from the carbonization of the outer surface, then they were dipped in suitable softening medium, and finally cut to the desired shape by the use of fixed crude lathe which could have been made of iron. On one of the implements there are regular concentric lines over the whole body. They appear to have been made by some sharp pointed crude lathe type of contrivance and as the lines of cut were made in a more or less

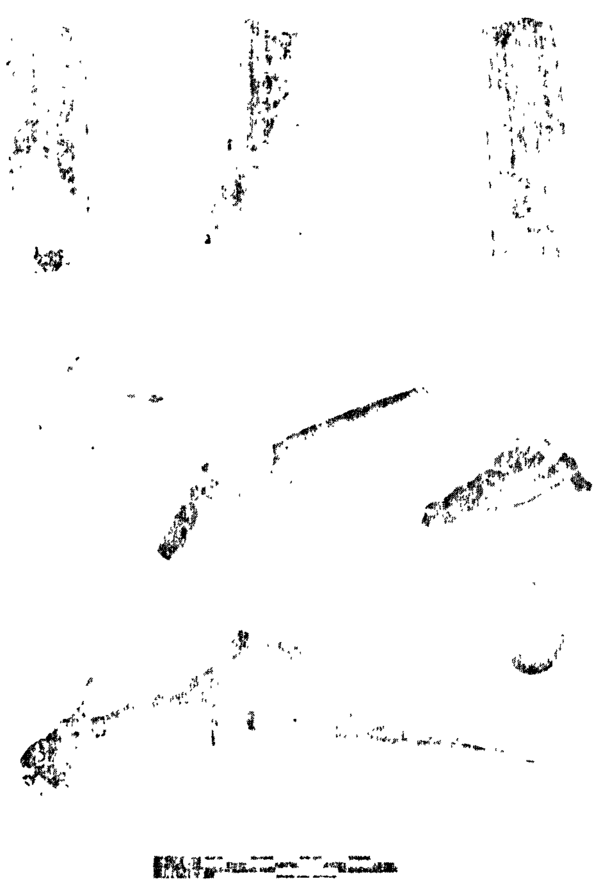

Plate I : Chirand, Neolithic bone axes, baton-de-commandment, etc., *(See page 19)*

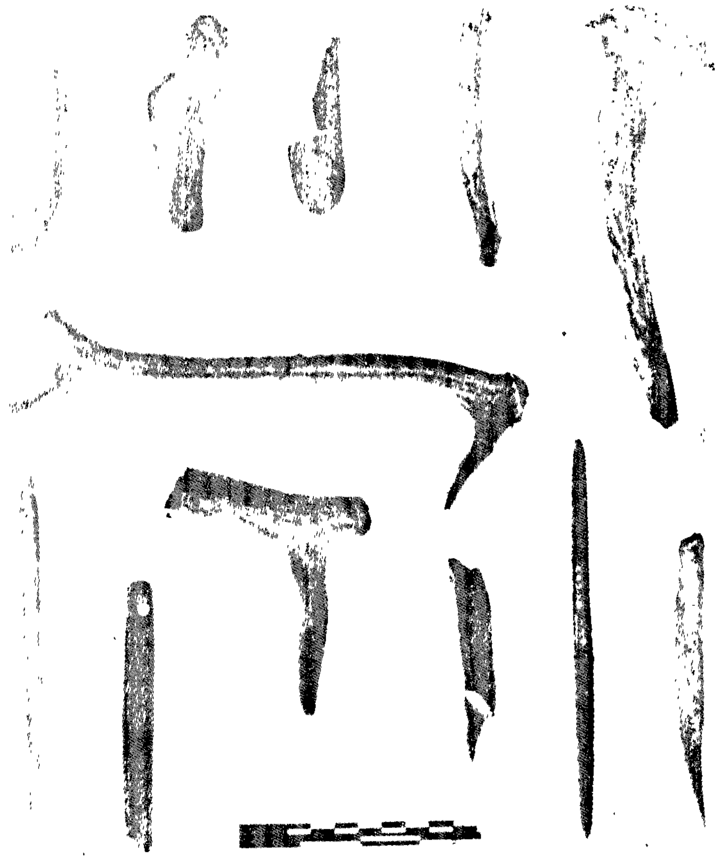

Plate II : Chirand, Neolithic bone implements, *(See page 19)*

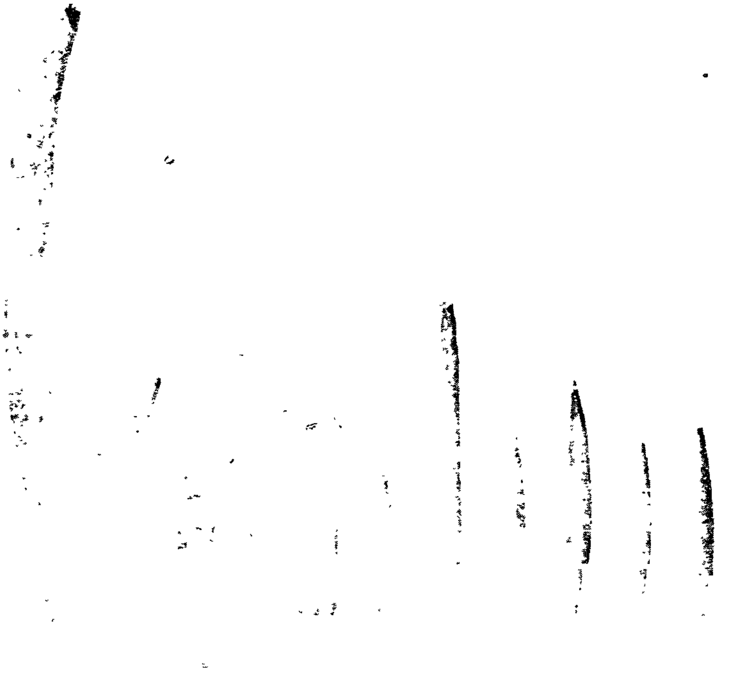

Plate III : Allahpur, different stages of making an arrowhead from antler, (See page 53)

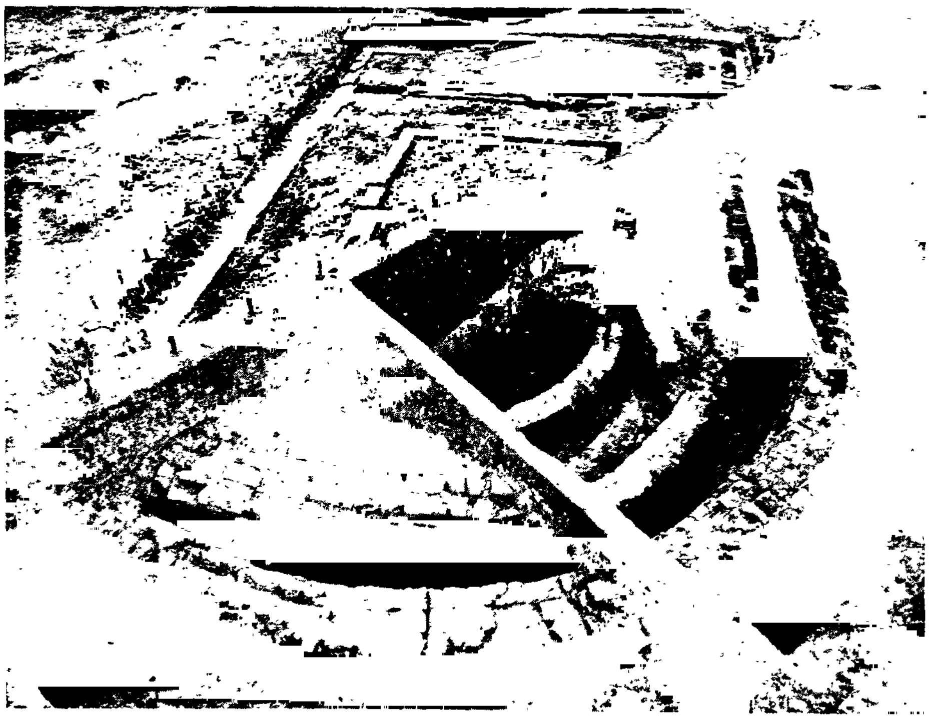

Plate IV : Banavasi, excavations of a brick Chaitya, Satavahana period, (See page 57)

regular pattern it is presumed that the bone structure was revolving on a definite axle.

There are brown encrustations on one of the bone implements which, on testing, were found to be an oxide of iron (Fe_2O_3) $-n-H_2O$. It was further confirmed by micro-chemical analysis. The brown coloured rings were of the same chemical composition as the grain deposits.

After fabrication, the tools seem to have been polished with the help of smooth stones and finally rubbed with soft skin. Another way of polishing these tools was to use wax or oil.

TYPOLOGY

The bone objects numbering 150 can be divided into the following typess:

A. POINTS

(a) Double ended points

(i) Sharp point and tapering tang.

(ii) Tang and body similar in form to the extent that they cannot be differentiated. They are generally without polish.

(b) Tanged-points

(i) Circular point divided from the tang by a flange. The tang and point are well defined and highly polished.

(ii) Long circular point with a small tapering tang.

(c) Long socketed point

(i) Long circular point with socket behind.

(ii) Elliptical point with socket behind and also having simple incised designs on both the surfaces.

(d) Hollow point with iron filling and tang hollow

(i) An example of this implement is of particular interest. A thin iron rod is found inserted in this cavity. The blade-body was hollow since the

portion of the bone used was either naturally or intentionally made hollow. The iron was used to achieve the required heaviness not only to avoid flying off mid-way but also to make it an effective piercing weapon. In all probability the tang was also of iron; in fact it appears to be an extension of the portion inside the cavity. Big hollow thorns of *babul* tree are used in this fashion in many parts of India.

B. Stilus

(i) Stilus with simple point.

C. Awl

(i) Long tapering awl with a groove near the point.
(ii) Tapering awl with simple point.

The researches done during the last twenty years have revealed a sizable number of bone implements from different excavations at Burzahom, Chirand, Ujjain, Nasik, etc, The working on raw antler is characteristic of Sarai Nahar Rai[9] and Chirand[10], etc. On the basis of these discoveries we may group the bone implements into the following cultural categories :

I Mesolithic (Sarai Nahar Rai)
II Neolithic (Chirand and Burzahom)
III Harappa (Mohenjo-daro, Chanhu-daro, Lothal, etc.)
IV Post-Harappan Chalcolithic Culture (Navdatoli, etc.)
V Painted Grey Ware (Hastinapur and Allahapur)
VI N. B. P. and Post-N. B. P. (Ujjain, Taxila, Kausambi, Nasik. Sonpur, etc.)

The variety of bone arrowheads, awls, etc., from Group I to IV are limited whereas from Group V and VI the tools are more in number and in variety of shapes. They are also found distributed in a much wider area. The objects of the later groups are very well finished and highly polished. The tradition of bone arrowheads, etc.. continued even up to c. A. D. 1000 (Ruper V).

References

1. The site was excavated under the joint direction of Dr. Romila Thapar of

Delhi University and Shri K. N. Dikshit of the National Museum, New Delhi. The countryside was well populated in the past by the hoardes of deers. Even ten years back the number was quite large but due to merciless hunting, they are now more or less extinct from this region.

2. Arrowheads of bone and iron are found mentioned in the *Rigveda* and *Samhitas*. Kautilya (*bk. II. ch. 18*) also mentioned five kinds of arrow-heads made of iron, bone or wood. To smear poison on the tip of the arrowhead was a common practice. See also S. P. Gupta, "Arrowhead-Its technology and History", in *Journal of the Bihar Research Society*, vol. XLVII, January-December, Patna, 1961, pp. 129-42.

3 B. B. Lal, "Excavations at Hastinapura and other Explorations in the Upper Ganga and Sutlej Basins 1950—52," *Ancient India*, nos. 10 & 11, New Delhi, 1955, pp, 13-14. See also *Indian Archaeology 1956-57—A Review*, New Delhi, p. 27. In the excavations at Ujjain, one of the bone arrow-heads was stained with the blood of a bird. A collapsed manufacturing of bone arrow-heads was also noticed (*IAR 57-58* p. 36 and pl. XLIII B). Bone industries were also reported in the past from the N B. P. and post-N. B. P. levels of Kausambi, Taxila, Nasik and Sonpur.

4. Shri R. K. Pant of the Archaeological Survey of India, Srinagar, is currently working on this problem.

5. S. A. Semenov, *Prehistoric Technology* (London, 1964), p. 145.

6. G. Watt, and P. Brown, *Indian Art Exhibition, Delhi* (Cal., 1903), p. 196.

7. Information from Shri E. Duncan of the National Museum, New Delhi. The author accompanied him to the workshops of ivory, antler, bone, etc.

8. Information from Shri B. N. Tandon, National Museum, New Delhi. The microscopic studies on bone tools were carried out by him.

9. Information from Shri Hem Raj of the Department of Archaeology, Government of Uttar Pradesh, Lucknow. The author had a chance to examine the material in 1970.

10. Information from Dr. B. S. Verma, now of the Arch. Surv. of India.

K. N. Dikshit

EXCAVATIONS OF A BRICK APSIDAL TEMPLE AT BANAVASI, DISTRICT NORTH CANARA

Banavasi is a small town in the Sirsi Taluk of North Kanara District, Mysore State. But in the early centuries of the Christian era, it was a great capital of Karnataka and was ruled by the Satavahanas, Kadambas and Chalukyas. The ancient site comprising a number of mounds covers an area of more than one square mile. Some of the mounds are 15-20 feet in height and contain brick structures. The bricks are large and typically Satavahana in character. Similar bricks were encountered in 1929 on the Satavahana site of Chandravalli, Chitaldrug Distrct, Mysore State.

At the centre of the town is situated the mediaeval temple of Madhukesvara, adjoining the bank of the river Varada. The sanctum sanctorum may be considerably older exhibiting some Kadamba features. The beautiful figure of Madhava now kept in the Sukanasi of the Madhukesvara temple belongs to the Chalukyan period. It has on its *prabhavali* the figures depicting the ten *avatars* of Vishnu. Considerable additions and renovation were carried out under the Kings of Vijayanagara and the Nayaks.

Inscriptions are not lacking at the place. On the four faces of a granite square pillar, was found in box-headed Brahmi a Kadamba inscription, the first of its kind, at Banavasi. It mentions the names of Kakusthavarman, Santivarman and Mrigesavarman of the Kadamba dynasty and refers to what seems to be a victory over the Pallavas for Mrigesavarman. Another Kadamba inscription found at Gudnapur in the vicinity of Banavasi belongs to the period of Ravivarma and mentions the names of the father and grand-father respectively of Mayurasarman, the celebrated founder of the Kadamba dynasty.

A number of coin hoards have been reported from the site. Sri Wodeyar produced, when we visited the place, the lead coins of Chutukulananda and Mulananda and also the well-known potin types of Yajna Sri with the elephant having an uplifted trunk on the obverse. He had even preserved the red polished pottery vase which contained the Yajna Sri coins.

There is a huge brick fortification enclosing the present habitation and most of the temples mentioned above. It is constructed of large-sized bricks measuring 16″ ×

3″ with a rubble foundation. The walls of the defences seem to have undergone repairs twice: once when brick bats were employed in large quantities and a second time when large-sized laterite blocks were used for that purpose. Similar laterite blocks are used even now for construction work.

One of the mounds (BNV I) was partly cut away for earth to construct a road bridge across the Varada river by Public Works Department contractors. The brick walls within the mound had been pulled out. Excavations were carried out here to determine the character of the building. The bricks were large-sized and measured 18″×10″×3″. The section revealed three stumps of brick walls with a platform projecting from it. Digging went down to the natural soil exposing four layers and a pit. The lower portion was much disturbed and on chasing the aps'dal portion of the walls, it was possible to find out the plan of the building. The bricks were laid out in the English bond system, i.e., alternate course of headers and stretchers.

On the whole, the structure turned out to be an apsidal temple with a platform. The local tradition believes that the mound contained a *Chaityagriha* and it may also be recalled that Huan Tsang who is credited to have visited Banavasi in the 7th Century mentioned the existence of a *Chaitya* on the banks of the Varada. Large quantities of floor tiles were found from the probable floor level of the structure indicating that the floor was paved with them. Two architectural pieces of stone belonging to this mound and said to have been found during the ransacking of the mound by the Public Works Department contractors werea *chandrasila* and a door jamb. The structure when completely dug up measured 26×13·5 metres Perhaps it is one of the largest brick *Chaityas* of the Satavahana period in the whole of south India.

In BNV II layers 5 and 6 represent the habitation of the site in the first half of the first century A. D. since it is these which yielded Russet-coated painted ware and immitation rouletted ware. In layer 5 was also found the remnants of a wall with large-sized Satavahana bricks.

Excavation was continued again during February 1971, and another large brick *Chaitya* (BNV VI) of the Satavahana Period was discovered on the bank adjoining the river. When completely dug up it measured 22·5×12·5 metres. The immitation-rouletted ware and the Russet-coated kaolin painted ware were also found in the layer below the structure. The date of this brick structure is therefore somewhat later than the first Century A.D. (Plate IV)

—*M. SESHADRI*

EXPLORATIONS OF PREHISTORIC SITES IN DISTRICT BIJAPUR

SOME UNUSUAL TOOL-TYPES FROM ANAGWADI

The site Anagwadi, District Bijapur, Mysore, has provided a very good evidence of Acheulian industry through the excavations carried out by the writer.[1] The Early Stone Age Acheulian industry of Anagwadi consists mainly of varied and numerous forms of handaxes and cleavers, as also other tool-types like choppers, scrapers and discoids. The tool assemblage, besides containing these usual forms, is characterised by the presence of a few peculiar forms showing clear evidence of hafting, notches in anterior portion, beak-shaped points etc.

DESCRIPTION OF THE TOOL-TYPES

The following four categories of tools of unusual forms are described below:

(i) Tools showing evidence of hafting.

(ii) Tools with notches.

(iii) Tools with beak shaped projection.

(iv) Tools with chisel edges.

(i) *Tools showing evidence of hafting*

It was thought by Foote[2] long back that many of the handaxes and cleavers were hafted. Sankalia[3] suggested that many of the pointed handaxes with comparatively heavy butts and cleavers with pointed butt ends (V-shaped) were hafted in wood or bamboo and the former could have served as spear-heads. Instance of handaxes with intentionally made tangs are rather rare. Supekar[4] has reported one such tool having convex working-edge and well-made tang from Hasalpur, Central Narmada basin. In the Anagwadi collection there are three such handaxes with well made tangs thereby showing undoubted evidence of hafting. One of the specimens is described below:

ANGW—125 (Fig. I,4)

An oval shaped handaxe on flake. Deep flake scars at butt end intentionally made to produce tang. Pebble cortex retained in central and butt portion. Tip end portion carefully worked. Shallow flake scars, prominent in general. Tip rounded.

Cross-section: asymmetrical biconvex. Brown quartzite. (110 × 73 × 35mm).[5]

(ii) *Tools with Notches*

Handaxes with notches, producing waist on the lateral sides, are of rare occurrence in the Early Stone Age industries in India. Notched Middle Acheulian ovates and Early Levallois flakes have been reported from Warsash, Hampshire (England), and Montieres (France) respectively. Specimens resembling these forms of handaxes were found in the Acheulian industry of Anagwadi. It appears that two prominent notches were meant for the purpose of hafting and butt end with edge all around as functional part of the tool either for cutting or chopping purposes. There are five specimens of this type in the collection and one of them is described below:

ANGW—73 (Fig I,5)

An elongated pear shaped handaxe on flake. Both under as well as upper sides fully worked. Shallow flake scars prominent. Numerous step flakes on both sides. Deliberately made notches in the anterior portion along lateral sides. Tip rounded. Cross-section: asymmetrical biconvex. Pink quartzite. (162 × 90 × 50mm)

(iii) *Tools with Beak shaped Projection*

In this category of tool-types a deep flake has been removed at the tip portion on one of the lateral sides of the tool so that the tool has beak like appearance. The presence of this prominent characteristic notch suggests that tools probably served as spoke-shaves for the shaping of wooden spears and also were useful for scraping flesh from long bones. There are three specimens of this category in the collection :

(a) Handaxe with beak Shaped Projection

This specimen was collected at a site Yedhalli situated 4 kms. downstream of Anagwadi.

YDHL—2 (Fig. I, 1)

A handaxe with beak shaped projection. Made on pebble. Shallow flake scars, prominent on both surfaces. A large patch of pebble cortex in the center. Deep concavity at the anterior portion. Cross-section: biconvex. Brown quartzite. (105 × 60 × 35mm).

(b) Beak Shaped Tool on Block

ANGW—258 (Fig. I, 2)

A specimen with prominent beak shaped projection. Made on rectangular natural block. Working restricted only along one face of the block. Other face completely unworked. Shallow flake scars prominent. Deep notch at tip portion. Part of the portion near tip end made flat for proper grip. Grey quartzite (105x51x35mm).

(c) Rostrocarinate tool types

There are four specimens of rostrocarinate type in the collection and these are similar to one described by C. van Riet Lowe [7]. In these, an oval shaped pebble is longitudinally split into two halves. The flat plain surface obtained by splitting is not further worked while high backed upper surface is completely or partly flaked in such a way as to get a central ridge or keel. At the tip end beak shaped point is produced by making a deep notch.

ANGW—77 (Fig. I, 3)

A handaxe with rostrocarinate form. Underside clean and flat excepting a few flake scars along margins. Deep flake scar at tip portion. Upper side highly backed; partly worked and characterised by median ridge. Pebble cortex retained over large area. Cross-section: triangular. Grey quartzite (120×70×40mm).

(iv) *Tools with Chisel Edges*

There are two specimens in the collection which are characterised by short chisel edges at the tip portion. Both these specimens can be grouped in the 'chopper' class of tool-types. The flaking on these tools is regulated in such a way that short chisel working edge is produced.

(a) ANGW—(Fig. I, 7)

A specimen with short chisel end on round based pebble. Butt end unworked. Flaking confined mainly to anterior portion on both sides. Chisel edge produced by vertical flaking at tip portion. Pink quartzite. (120×110×65mm).

(b) ANGW—75 (Fig. I, 6)

A specimen with short chisel end made on natural block. Shallow flake scars

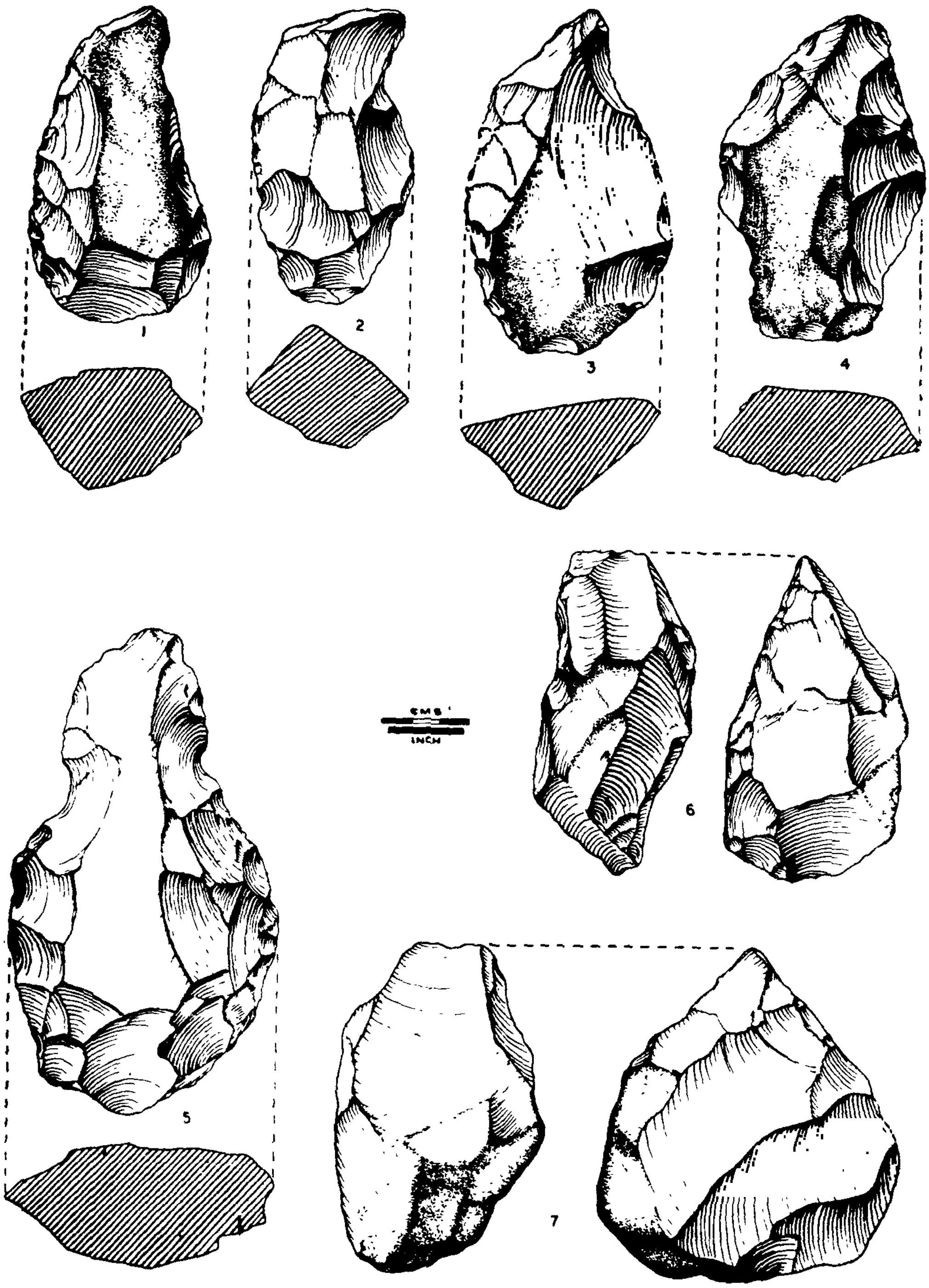

Fig. 1, Stone Age tools from Anagwadi

prominent all over the surface. Short and sharp chisel edge produced at tip portion by vertical flaking. Butt end fully worked. Pink quartzite. (115×70×52mm).

The presence of the above mentioned unique forms of tools indicates the advance nature of the Early Stone Age industry in India.

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R. S. Pappu

A 5-day symposium on "Radiocarbon Applications in Archaeology and Geophysics" will be held at the Institute of Fundamental Research, Bombay, during the first half of March 1972 under the Secretaryship of Dr. D. P. Agrawal. It has also been tentatively decided to cover the following topics in the various scientific sessions:

(i) Pre-and Protohistoric chronology in India.
(ii) Geophysical and Hydrological investigations.
(iii) Pleistocene studies.
(iv) Synthetic models on archaeological data.
(v) Decipherment of the Indus script.

A number of distinguished scholars from foreign countries are also likely to attend.

BOOK REVIEWS

THE INDIAN CIVILISATION : THE FORMATIVE PERIOD

(INDIAN INSTITUTE OF ADVANCED STUDY, SIMLA, 1968) PRICE: Rs. 20.

By S. C. Malik

For years there was no sequel to Subbarao's book, *The Personality of India.* That was a brave and pioneering work, an attempt to understand archaeological data Both before him and afterwards, there have come out a number of important books on Indian archaeology but most of them have 'described' the archaeological evidence rather than interpreting it. It is therefore gratifying to note that a thought-provoking book on interpretative archaeology has finally come out, and that too from the pen of a worthy student of the late Subbarao. Malik's book brings in some fresh air into the world of now stale archaeological reports.

Malik has tried to interpret and understand the phenomenon of the Harappa culture, by way of illustration of the approach he wants to use. He has not only tried to theorise on the Harappa culture, but also to explain the personality of India and its so-called changelessness. In doing this he lands himself in trouble.

In trying to prove the changelessness of India he conceives of trade-routes of the hunting-gathering stage which were used later on by the urban centres. Now regular trade and its routes are concomitants of civilisation; they had no function in the food gathering early Stone Ages. Then he quotes the changelessness of the Harappan script. Who has studied the changes, if any, stratigraphically. S. R. Rao holds that the script has developed. One knows however that the Brahmi script was a dynamic and changing script.

There is something lacking in the marshalling of the archaeological data or its mature appreciation. For example, he denies the existence of lavatories in the Harappan times; his assumption that the Harappa culture developed out of the Pre-Harappan cultures. Tracing this development has so far been an elusive problem for the archaeologists but the author makes a bland but far-reaching statement without bothering to prove it.

There are many assumptions of the author which are put across as proven facts, e.g., there was no legal coercion in the Harappa culture.

In his preoccupation with the changelessness he merges the Bronze Age revolution

of the Harappa cultures, that started in the 24th century B.C., into the Iron Age one in the Doab which cannot be placed earlier than the 6th century B. C. Similarly he says that there were inter-related settlements all over India in the mid-IInd millennium B. C. Now where is the evidence for all this ?

In his method all generalisations emerge from the theories of the new American anthropologists, without due regard for Indian data. He seems to have made them inexorable laws. He reminds one of Dange's work (*India: from Primitive Communism to Slavery*) in which he quotes Marxist scriptures and then looks for their Indian parallels.

Proper theorising requires a full and digested knowledge of the archaeological data. He neither takes into account the ecological zones nor the time factors involved. The second urban revolution of the Doab was a direct product of the Iron Age and had hardly anything to do with the Harappa Culture. Of course, in the later day Hindu culture and ethos a number of cultures contributed through the millennia, a major source being the Harappa Culture.

The author has not cared to mention the far-reaching technological advances which help us build socio-economic patterns from the mute artifacts. Nor the use of randomised data sampling, statistical analysis and modelling techniques to make the archaeology a social science. How archaeological research has to be 'designed' for testing specific hypothesis needed to be told.

Instead of quoting extensively from American anthropologists' theories only, he was expected to give some of the methodologies of New Archaeology. For valid reconstructions of the prehistoric Indian society, one cannot just extrapolate from theories, as if they were some absolute laws. S. P. Gupta in his recent book on the Disposal of the Dead and Physical Types in Ancient India has discussed this point at length and then pertinently remarked that the Social Laws are not to be equated with the Laws of Nature; in fact the use of the term 'Laws' in the context of Social Science is not correct. One has to use a thousand ingenious ways to learn about the extinct societies. For example, mapping of distribution of Pollen in different rooms led to the determination of various room functions, and groupings of activities within the community. Or the use of systems analysis in Oxaco valley for studying the change from nomadic to sedentary life style and beginnings of social stratification. Or the various inter-disciplinary methods being used to reconstruct the Pueblo societies.

Reconstruction of extinct communities is much more difficult than appears

from Malik's facile theoretical extrapolations. It requires the arsenal of tools and techniques used by New Archaeology and painstaking work. Data collection using the new multidisciplinary tools will alone lead to objective inferences about the past Indian societies. One hopes that in the revised edition of the book an attempt will be made to create a multidimensional awareness of the archaeological problems.

There are two vital roles his book could play: (i) to shake the Indian archaeologists from their 'descriptive' stupor; and (ii) to show a constructive way of synthesising the archaeological data. In the first aim, the book succeeds pre-eminently. The second purpose requires a more sustained work in depth.

A reviewer's task is very easy. He can extol a work or shatter it to pieces—without ever producing a constructive piece himself. Whatever criticism is offered here is meant as an appeal not only to improve but to drastically transform the revised editions. The reviewer has great expectations from the young and creative anthropologist that Dr. Malik is. We are all thankful to him for shaking us out of our stupor; but now he has to work harder to show us the proper way.

D. P. Agrawal

A BIBLIOGRAPHY ON INDIAN MEGALITHS

(STATE DEPARTMENT OF ARCHAEOLOGY, GOVERNMENT OE TAMILNADU, 1971)
XI+184 PP. AND 18 FIGURES, PRICE RS. 12.50

By K. S. Ramachandran

There has been an almost-total absence of bibliographical material pertaining to Indian archaeological studies. This lack of essential research-tool sadly reflects the state of archaeological studies in our country, resulting thereby in a lop-sided approach to the subjects. That is so since, more otten than not, the latest publications are not easily available to the research workers engaged in different areas of study. Ramachandran's *Bibliography* seeks to, and goes a long way to fulfill this need, particularly of those scholars who have no direct access to the literature on the subject and some of which is already out of print and inaccessible.

Originally serialized in the *Quarterly Journal of the Mythic Society* (Vols. LII, nos. 1-4, LIII, nos. 3 & 4, and LIV, nos. 1 & 2, published between the years 1961-1963), this *Bibliography* has been brought up to date by Ramachandran (till 1970) and incorporates almost all the relevant literature on Indian megaliths. As it is, the task of listing

the articles in itself is quite considerable and the compiler has added to the utility of the work by not merely alphabetically listing the various entries, but has also provided brief synopsis for each entry. Besides, an index of the megalithic types and sites in India and a general index have also been added to provide the reader with ready-reference. A glossary of terms and a chart equating the terminology and nomenclature used by various workers in the field with that used by the pioneer in the field, V.D. Krishnaswami, has also been given. Ramachandran has thus succeeded in giving an almost encyclopaedic character to his *Bibliography*, exaggerated though it may sound to those unused to such efforts. To those unacquainted with the basic types and the areas of their distribution, a map and illustrations of the megaliths would prove particularly useful.

As has been pointed by B. K. Thapar in his Introduction to the *Bibliography*, interest in the study of Indian megaliths really began with the publication of James Fergusson's classic work *Rude Stone Monuments in All Countries: Their Ages and Uses*, even though the megalithic tombs of Malabar had been excavated by Babington as early as in 1823. Notwithstanding the many discoveries and the attempts at various academic levels to collate the ever-increasing data, much remained to be done till V.D. Krishnaswami took up the study of the subject and came out with the classification of the megalithic types of south India, which was published in *Ancient India*, no. 5, 1949. However, the problems connected with their chronology, cultural association, etc., continued to remain an enigma and led to much controversy verging on polemic at times. Even with regard to the nomenclature of the various megalithic types, there seems to be no unanimity. Ramachandran's chart equating the terminology and nomenclature evolved by the various scholars with that of Krishnaswmi and the glossary of terms would be of great help to the beginners and to those who are not acquainted with the material and are likely to misunderstand the facts for this lack of standardized nomenclature.

With the latest discoveries of the megalithic remains in the areas outside the peninsular parts of India which have extended the boundaries of the megalithic remains to the northern-most parts of India, the subject has assumed still greater importance. This *Bibliography* should serve as an introduction to those who desire to delve into this fascinating, yet a vexed, problem. To those who are already engaged in this study, this *Bibliography* would be of permanent value.

Ramachandran has put in much labour in the preparation of the work. In the 369 entries, he has included almost all the material pertaining to the megalithic remains and theoretical studies thereof dealing with the various aspects of the megaliths in India. Unfortunately not much care seems to have been taken at the time of its printing and

almost every page abounds in printing mistakes. The compiler could also have systematized the annotation by adopting a standard pattern; this, however, does not detract the quality or lessen the importance of the work. It is hoped that this shortcoming would be taken care of in the next edition and the co-ordinates of the sites would also be given.

B. M. Pande

THE COPPER-BRONZE AGE IN INDIA

(MUNSHIRAM MANOHARLAL, DELHI, 1971); PAGES 270. PRICE RS. 55

by D. P. Agrawal

This book presents a comprehensive survey of the protohistoric period in India based on the archaeological, technological and ecological data set in a logically argued chronological framework, which is based on the archaeological evidence as well as on a critical assessment of the C^{14} dates of which the author is a leading exponent in India. The book deals with the evidence on the copper-technology of the different cultures and assesses the role of the interaction of technology and the prevailing ecology in the genesis and growth of various protohistoric cultures. The book provides an authoritative summary of the evidence on metal-technology and chronology of the protohistoric cultures, and succinctly deals with the ecological background of not only the Indus Valley Civilization and its wide ramifications both in time and space but also of the early cultures of the Doab,and of Central and Western India. The evaluation of Raikes' theories of the impounding of the Indus is indeed stimulating. The book offers the first serious attempt at a multi-disciplinary approach for the reconstruction of Indian protohistory.

It may, however, be pointed out that at places the text has become a bit too terse. The author has tried to cover a vast gamut in a short book of this type; he should have elaborated the data in greater details. The section on ecology appears weaker than others, perhaps due to the paucity of relevant data. The system of reference, though novel and space-saving, seems a little cumbersome. For the wealth of latest references on a number of relevant topics, however, the book is exceptionally rich and rewarding.

The printing and get up of the book are excellent. The price of the book, however, is a little high for the pocket of the student and the 'private' scholar.

Krishna Deva

READINGS IN INDIAN ARCHAEOLOGY

Abstract from "The Indus Valley Culture (Seen in the context of Post-Glacial climate and Ecological studies in North-West India)" by Gurdip Singh of the Deptt. of Biogeography and Geomorphology, Research School of Pacific Studies, Australian National University, Canberra, published in *Archaeology and Physical Anthropology in Oceania*, vol. VI, No. 2, July, 1971 pp. 177-189.

One of the most debated of the issues concerning the Indus people in recent years has been regarding the postulated occurrence of higher rainfall conditions during the period they are known to have flourished in north-west India. Ever since Stein (1931), on the basis of the occurrence of "gabar bands" (dam-like structures constructed artificially by prehistoric man), suggested the possibility of a significant decline in rainfall of Baluchistan since prehistoric times resulting from climatic change, other authors have produced additional evidence, in one form or another, to support the hypothesis (Marshall 1931; Vats, 1940; Wheeler, 1968; Chowdhury and Ghosh, 1951). Deductions on the nature of climate during Harappan times have so far, however, rested on indirect evidence provided by human artifacts, such as sculptures, drawings and engravings of animals and plants on potsherds and steatite seals, burnt bricks, animal bones, wood and charcoal remains, flooding horizons and the occurrence of "gabar bands". In recent years, the testimony to higher rainfall argued for each of these lines of evidence has been questioned by some authors (Raikes, 1964, 1965*a*, 1965*b*; Raikes and Dyson, 1961; Dales, 1966). Without going into details either for or against the issue at this stage, it may suffice to say that sufficient weight had been attached to the counter-arguments for Dales (1966, p. 131) to say: "Convincing evidence, collected from both archaeological and natural science investigations, refutes the popular theories of appreciable climatic change in the South Asian area during the past four to five thousand years (Raikes, 1965*a*; Raikes and Dyson, (1961). Climate has thus been practically eliminated as a major factor in the environmental fortunes of the Harappan civilization."

The interests of the present author, who is primarily a plant palaeoecologist, do not rest directly in the line of archaeology. Recently, however, a series of new evidence has emerged from pollen-analytical studies of salt-lake deposits carried out by the author in an area centring on the Rajasthan desert in north-west India, which reflect closely on the nature of climate of the period of the Indus Valley culture and has largely prompted the present contribution (Singh, 1970). Besides the post-glacial climatic sequence, the studies have also brought out evidence suggesting the possibility of early primitive agriculture in north-west India, antedating the Harappan culture by

about five thousand years.

The present contribution is an attempt to open the question of the nature of climate governing the Indus culture once again and to consider the rise and fall of this culture in a palaeoecological context. with special reference to the possibility of a gradual evolution of the art of agriculture in north-west India since early postglacial times.

THE AREA INVESTIGATED

The area covered by the present investigations is broadly comprised of the State of Rajasthan (20°3′ N.–30° 12′ N. latitudes and 69° 30′ E.–78° 17′ E. longitudes), and some bordering areas in the adjoining States of the Punjab, Haryana and western Uttar Pradesh, in noth-west India. The investigations comprising studies on the late-Quaternary history were confined to the Rajasthan territory, whereas the work on surface samples for determining basic criteria for the interpretation of pollen diagrams was extended to the other provinces.

STRATIGRAPHICAL, PALAEOECOLOGICAL, AND CULTURAL CONSIDERATIONS

The known time range of the Indus culture, which is about five hundred years, is only a small fraction of the Holocene period. While it would be quite futile to dwell in detail on the findings pertaining to the entire post-glacial period, it is necessary to have a long-range perspective of the climatic sequence for a consideration of the development of the late-Holocene cultures, including the Harappan culture, in their natural settings. It is therefore proposed to present an outline of post-glacial environmental history preceding the Indus Valley culture, together with some of the basic evidence, and to discuss the same in the light of the known cultural history.

The environmental sequence which is built up here from the vegetational history deduced from pollen analysis has been grouped into six phases of which all but phase I belong to the Holocene period. Phase I, which is primarily inferred from the general stratigraphy of the salt-lake basins, is pre-Holocene. Phases III, IV and VI are further suhdivided into subphase IIIa, IIIb, IVa, IVb, IVc, VIa and VIb, following the zonation of the pollen diagrams. The pollen record comes wholly from the Holocene. as fossil pollen is not preserved in the pre-Holocene sandy material. The post-glacial pollen sequences from the sites investigateda re divisible into five zones termed A, B, C, D and E, of which zones B, C and E are subdivided into sub-zones B_1, B_2, C_1, C_2, C_3, E_1, and E_2. The original pollen diagrams, together with their detailed descriptions, will be published elsewhere. In the present discussion only

phases I, II, III and a part of phase IV, which are relevant to the Indus Valley culture, are considered.

Phase I : Before 8000 B.C.

The evidence for phase I comes mainly from the stratigraphy of the salt-lake basins. The earliest lake sediments, which date from early Holocene times at all the sites, are underlain by a thick bed of loosely packed, wind-borne sand. In each case the sand is seen to extend horizontally to meet the sand dunes (which are now stabilized) encircling the individual salt-lake basins. This suggests that the basins were probably formed during pre-Holocene times by the damming of ancient valleys by wind-borne sand, at a time when the sand dunes were still active. While the beginning of this phase of severe, pre-Holocene aridity is uncertain, there is evidence that the phase ended with an increase in rainfall at about the beginning of the Holocene period. This is shown by two radiocarbon assays obtained separately from Sambhara (9253±130 B.P., TF-887) and Lunkaransar (9260±115 B.P., WIS-405), from levels about 30–40 cm. above the sand/clay boundaries at the two sites. From these results a date for the infilling of the lake basins can be extrapolated of around 10,000 B.P.

There is practically nothing known of the human cultures occupying north-west India during this phase. At present there appears to be a somewhat abrupt break between the largely Upper Pleistocene Middle Stone Age cultures and the exclusively post-glacial microlithic Late Stone Age cultures in north west India. This is quite unlike the situation prevailing in southern India, where the change from Middle to Late Stone Age, that is to say from the flake to the microlithic tradition, appears to have been a process of continuous development rather than of sudden change (Allchin and Allchin, 1968, p. 78). Whether the hiatus between the Middle Stone Age and the Late Stone Age cultures in north-west India was in some manner influenced by the severe aridity prevailing during pre-Holocene times is not certain. From the present evidence it would, however, appear that the central core of north-west India was affected by severe aridity and that the territory would have been unsuitable for habitation for a long time during at least the later part of the last glacial.

Phase II : Pollen zone A : 8000 B.C.-c. 7500 B.C.

This phase starts with the first sedimentation of freshwater lacustrine deposits in the lake basins, a development that appears to have occurred at about the beginning of the Holocene period around 10,000 B.P. The lake sediments consist of laminated clays and contain a fair amount of fossil pollen at all the sites, thus allowing the reconstruction of the vegetational history of the post-glacial period.

The vegetation as deduced from the pollen record in phase II, represented by pollen zone A, is comprised of high values for sedges and grasses and low values for halopytes denoted by Chenopodiaceae/Amaranthaceae. *Artemisia,* which now grows abundantly under a higher rainfall regime (above 50 cm. average annual rainfall) mostly in the Himalayan foothill plains and which is at present rarely seen in the Rajasthan desert, appears to have flourished in large numbers during this phase in both the contemporary Arid and the Semi-Arid belts. Mesophytic plants such as *Mimosa rubicaulis* and *Oldenlandia*. which now grow mostly east of the Aravalli Range and upcountry in Punjab and Haryana, are indicated as having occupied the Semi-Arid belt in western Rajasthan. There is little desert vegetation represented in the Semi-Arid belt in this phase : small quantities of *Ephedra* pollen, which is notorious for being wind-transported over long distances (Maher, 1964), is, however, seen regularly; a few grains of *Maytenus*, a desert plant species, make their appearance in the later part of the sequence in this phase. As there is no further intercalation of sand layers in the lake sediments, it is suggested that the sand dunes had started to stabilize. That the rainfall was considerably more than that of the present day, with freshwater conditions prevailing in the lake basins, is apparently testified by the presence, in both the Arid and the Semi-Arid belts, of *Typha angustata*, a freshwater aquatic species no longer seen in the Rajasthan desert beyond the 50 cm. isohyetal line. The present evidence would thus indicate that there was an excess of at least 25 cm. (10 in.) of precipitation over the present in the Arid belt in phase II.

Phase II corresponds in time to the pre-Boreal period in Europe, when temperatures are known to have started rising throughout the world, including north-west India, following the final recession of the last glacial (von Post, 1946; Godwin, 1956; Iversen, 1954; Singh, 1963). In the Rajasthan desert, as is seen above, the climatic change is suggested to have taken the form of an increase in rainfall.

The state of human cultures occupying the Rajasthan desert during this phase is largely a matter of conjecture, as work on Late Stone Age microlithic cultures in India is still in its infancy. Nevertheless, the climatic conditions of the Rajasthan area, as inferred above, appear to have been favourable enough to support freshwater bodies and perennial river courses, which in turn can be expected to have supported animal and human populations.

Phase III : Pollen zone B : c. 7500 B.C.-c. 3000 B.C.

The initial rise in precipitation in phase II appears to have given way to a slight lowering of rainfall around 7500 B.C., which was, however, not severe enough sub-

stantially to alter the overall ecological patterns already established during the earlier phase. While the sedges decline, the halophytic vegetation, represented by Chenopodiaceae/Amaranthaceae, starts a gradual rise. Desert shrubs, such as *Maytenus* and *Capparis*, begin to occur more regularly in the Semi-Arid belt. The freshwater aquatic vegetation, consisting of *Typha angustata*, *T. latifolia* and *Potamogeton*, was apparently not affected, suggesting the continuation of freshwater environments in the lake basins. Mesophytic plant species *Artemisia*, *Oldenlandia* and *Mimosa rubicaulis* are also suggested to have continued flourishing in the Semi-Arid belt, and all except *Mimosa rubicaulis* occurred, to a lesser degree, in the Arid belt.

Phase III, which is represented by pollen zone B and ranges between *c.* 7500 B.C. and *c.* 3000 B.C., can be broadly equated chronologically with the combined Boreal and Atlantic periods of Europe (Godwin, 1960). Its lower limit is determined by two radiocarbon analyses mentioned earlier from Sambhar (9250±130 B.P., TF-887) and Lunkaransar (9260±115 B.P., WIS-405), dating the boundary between pollen zones A and B to about 7500 B.C. at both sites.

Early Agriculture : The late Stone Age microlithic culture (or cultures) which preceded the Neolithic-Chalcolithic cultures in north-west India and is most likely to have been dominant in the Rajasthan area, unfortunately remains undated for most of the part. At a few places where the remains of the culture have been found in stratigraphical context, it tends to overlap the known Neolithic-Chalcolithic cultures in its upper levels, whereas its early history remains almost unfathomed. The earliest radiocarbon dated horizons go back to approximately 5500 B C., in the rock shelters excavated at Adamgarh hill in the Narbada valley (Allchin *et al*, 1968). These sites, together with another microlithic site at Langhnaj, in Gujarat, show evidence of contemporaneity for a considerable period with Neolithic or later settlements in adjacent regions (Allchin *et al*, *loc. cit.*). Speaking of Langhnaj, Joshi (1963, p. 3) remarks that "on the basis of this site, it may be said that this phase is characterized by communities which have a mixed economy and might be practising some sort of primitive agriculture along with hunting and fishing, domestication of animals to some extent burying their dead and having a slightly more settled pattern of life than the wandering folks".

In the salt-lake profiles from western Rajasthan one witnesses an extraordinary rise in carbonized vegetable remains (mostly wood fragments) in the sediments at about the beginning of phase III (pollen zone B) at all the sites. The phenomenon cannot be explained in terms of natural causes as the enhanced rate of the occurrence is maintained in layer after layer of the lake sediment, starting with phase III. It can be strongly argued that the increase in the burnt remains resulted from the introduction

of the practice of scrub burning at the hands of early man, for this alone can explain the synchronous rise in their occurrence in the lake profiles of sites separated by hundreds of kilometres. It is seen that the practice of scrub burning as attested by the above evidence remained at a high level in phases III and IV (pollen zones B and C) and then dwindled away in phases V and VI (pollen zones D and E). It is of considerable interest to note that Cerealia-type pollen (grass pollen more than 40μ; size range $40-50\mu$) also starts occurring in the lake sediments early in phaseIII (pollen zone B) and continues to appear intermittently throughout phases III and IV at all the sites in close harmony with the enhanced occurrence of carbonized remain The evidence of scrub burning, together with the first occurrence of Cerealia-type pollen in the lake profiles, is dated at 9260 ± 115 B.P. (WIS-405) at Lunkaransar in the extreme west and at 8300 ± 135 B.P. (TF-738) at Sambhar in the extreme east. The close correlation between the occurrence of Cerealia-type pollen on one hand and the evidence of scrub burning on the other raises the obvious question as to whether some sort of primitive cereal agriculture was introduced into the area as far back as 7500 B.C.

Before proceeding any further one may, however, ask whether the Cerealia-type of pollen seen in the salt-lake profiles from Rajasthan does in fact represent cereal pollen. In this regard studies of present-day pollen spectra from 114 samples coming from 64 different sites spread all over north-west India have demonstrated that cereal pollen, mainly because of its large size, is not carried a great distance from its mother source, so that the pollen type is not seen in areas which are free of cereal cultivation. Some wild grasses can indeed be expected to contribute large-sized pollen similar to the Cerealia-type, but the introduction of such wild grasses through purely natural means over an axis of 200 kilometres (separating Lunkaransar from Sambhar) during the same time interval at the beginning of phase III and in conjunction with the first introduction of scrub burning in the territory, seems rather far-fetched. On the other hand, it would appear from the evidence that man had already started interfering with the natural vegetation in western Rajasthan at the beginning of phase III and it is not unreasonable to believe, therefore, that the burning of scrub was probably involved in the practice of some form of primitive cereal agriculture, the like of which was still prevalent with several tribal communities until quite recently in Rajasthan. It goes without saying, however, that the present evidence suggesting an exceptionally early start for cereal agriculture in north-west India needs to be supported with material evidence from excavations at the numerous microlithic settlements found scattered all over the Rajasthan desert, and outside.

Phase IV : Pollen zone C, c. 3000 B C.-1000 B.C.

At the beginning of this phase, about 3000 B.C., the climate seems to have taken a sudden change to wetter conditions. The period of maximum wetness, however,

appears to have lasted only up to about 1800 B.C. Thereafter, the colimate shows a small-scale oscillation to drier conditions between *c.* 1800 B.C. and *c.* 1500 B.C., followed by a slight reversal to a relatively weak wetter interval, lasting up to about 1000 B.C. This period of change is considered as phase IV, which is subdivided into subphases IVa, IVb and IVc, denoting the above threefold oscillation of climate during the mid-post-glacial. Of the three subphases, only subphases IVa and IVb are relevant to the present discussion.

(i) *Subphase IVa : Pollen subzone C_1: c. 3000 B.C.–c. 1800 B.C.* The beginuing of subphase IVa, which is marked by the boundary between pollen zones B and C, is dated around 3000 B.C. from two radiocarbon analyses, 5060±70 (WIS-387) and 5420±70 (WIS-386) from above and below the zonal boundary respectively at Lunkaransar. At Sambhar the date for the same boundary is extrapolated to 3000 B.C. from two radiocarbon determinations, 4665±115 and 4510±110 (TF-739 and TF-884), from about the middle of subhase IVa (subzone C_1).

Palaeoecologically, the subphase starts with a sudden rise in the frequencies of sedges and those of tree and shrub vegetation. The latter rise for the first time in the post-glacial sequence, at all the sites. The trees and shrubs mainly consist of *Syzigium cuminii*, *Mimosa rubicaulis*, *Acacia* sp. *Prosopis cineraria*, *Capparis* sp. and *Tamarix* sp. in the Semi-Arid belt, and of *Calligonum polygonoides*, *Zizyphus* sp., *Prosopis cineraria*, *Maytenus* sp. and *Syzigium cuminii* in the Arid belt. The sedges reach their maximum frequencies more than 500%of all other land-plant pollen in the Semi-Arid belt and are almost as prominently represented in the Arid belt. The present evidence would indicate that *Syzigium cuminii*, a mesophytic tree now growing naturally in India in areas having in excess of 85 cm. (35 in.) average annual rainfally (Troup, 1921), enjoyed a luxuriant growth in the Semi-Arid belt and that it even penetrated the western extreme of Rajasthan, as far as Lunkaransar in the Arid belt. Similarly. *Mimosa rubicaulis*, a mesophytic shrub mentioned earlier in phases II and III, rises to its highest frequencies in the Semi-Arid belt in subphase IVa. *Typha angustata* continues to grow in both the Arid and the Semi-Arid belts as before. The above palaeoecological picture of subphase IVa goes to suggest that relative precipitation over the Rajasthan desert had risen considerably and that the annual average rainfall may have been in excess by at least 50 cm. (20 in.) of the present-day rainfall in the Arid belt. In the light of all this evidence the doubts expressed earlier with respect to a relatively higher rainfall in north-west India during Harappan times (Raikes, 1964*a*, 1965, 1965*b*; Raikes and Dyson, 1961; Dales, 1966) can perhaps now be set aside.

Pollen of Cerealia type, of the same size range as seen in the earlier phase, continues to be met with at all the sites in subphase IVa, without any recognizable hiatus. At the same time evidence for scrub burning in the form of carbonized remains also continues into this subphase.

(ii) *Expansion of Neolithic-Chalcolithic Cultures.* It is of profound interst to note that subphase IVa, in terms of chronology, sees the rise of the pre-Harappan and later on, of the Harappan culture throughout north-west India. It is generally agreed that in the plains of Sind, the Punjab and northern Rajasthan, around the end of the fourth or the beginning of the third millennium B.C., the major expansion of the Neolithic-Chalcolithic way of life took place (Allchin and Allchin, 1968, p. 112). The earliest radiocarbon evidence so far available is the date of pre-Harappan settlement at Kot Diji, placed at 2605$\pm$145 B.C. The testimony of Cerealia-type pollen for the existence of cereal agriculture in the latter half of subphase IVa cannot be doubted as the Harappan people are definitely known to have practised cereal cultivation. The question is, however, relevant when the pollen is encountered in earlier horizons.

Here it may be of interest to point out that Cerealia-typo poollen of the tame size range is encountered in good numbers (58% of total land-plant pollen) in the pre-Harappan levels of the Indus Valley site at Kalibangan, excavated by the Archaeological Survey of India. This, together with the unbroken record of Cerealia-type pollen in the pollen profiles and the evidence of forest burning from three different sites, would lead one to believe that the practice of cereal cultivation perhaps does not start with the Indus Valley culture after all but that the practice had existed in the region for a long time, indeed, as has been suggested, from the beginning of phase III. It can in fact be argued that the significant increase in rainfall at the beginning of the third millennium B.C., attested by the palaeoecological evidence, played an important part in the sudden expansion of the Neolithic-Chalcolithic cultures in north-west India, ultimately leading to the prosperity of the Indus culture.

(iii) *Subphase IVb : Pollen subzone* C_2 *: c. 1800 B.C.–c. 1500 B.C.,* The end of subphase IVa and the beginning of subhase IVb can be dated around 1800 B.C. by extrapolation from two Rdiocarbon determinations mentioned earlier (TF–739 and TF–883), from subphase IVa at Sambhar. For subphase IVb the palaeoecological evidence points to a short dry period. The sedges undergo a sudden decline. All the mesophytic plant species found in subphase IVa, such as *Syzigium cuminii*, *Mimosa rubicaulis* and the freshwater aquatic species, disappear for good from the pollen sequence. At Lunkaransar, in the Arid belt, the horizontal stratification of laminated clays breaks down and pollen is no longer preserved in the sediment, both factors indicating that the lake had started drying out. In the Semi-Arid belt, with the disappearance of freshwater aquatic vegetation, it would appear that the lakes had started turning saline. Indeed there is some rise in the frequencies of halophytic plant species at Sambhar. *All this goes to indicate that a dry period of some intensity had set in about 1800 B.C. It is a rare coincidence that the Harapan culture is known to have started declining around 1750 B.C.* (Agrawal *et al.*, 1964). The archaeological evidence has been interpreted to suggest

that the Harappan culture met with a sudden end. The same evidence, however, also indicates that a general decline had already set in much before the final blow (Wheeler, 1968, p. 127), which some believe to have been struck by the Aryan invaders (Wheeler, *loc. cit.*; Allchin, *et al* 1968, pp. 144–156). *The present evidence would suggest that the onset of aridity in the region around 1800 B. C. probably resulted in the weakening of the Harappan culture in the arid and semi-arid parts of north-west India but that the peripheral to the same degree.* The extinction of the Indus culture may have been initiated through gradual decline as a result of climatic change, but the process may yet have been completed by successive invasions from the north-west by the Aryans.*

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* The original paper contains two figures and more details.